JAWAHARLAL NEHRU
ON
SCIENCE

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Speeches Delivered at the Annual Sessions of the Indian Science Congress

Edited by
BALDEV SINGH

NEHRU MEMORIAL MUSEUM AND LIBRARY
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Contents

Foreword

Science occupied a central place in Jawaharlal Nehru's vision of the good society. As a scholar at Cambridge, he had acquired a sensitive understanding of the intellectual matrix of the sciences; and this understanding gained in depth a decade later through extensive reading of socialist literature. Cumulatively, these influences encouraged Jawaharlal Nehru to place a great emphasis on science and technology as the basis of social development in India in the 20th century.

Yet science for Jawaharlal Nehru was more than just a constellation of disciplines dealing with the development of material resources. He was equally concerned with what he described as the scientific temper; or the world-view which enables man to look upon himself, upon society and upon the problems facing mankind with an intellectual rigour that combines sympathy with objectivity in finely balanced proportions. The inculcation of a scientific temper, so Jawaharlal Nehru believed, was the highest challenge faced by man, individually or collectively. Indeed, to the extent a people reflected the scientific temper in their day-to-day activities, to a corresponding extent would they successfully resolve the problems of social existence and social development.

Jawaharlal Nehru's passion for science took many forms. But one indication of the importance he attached to science lay in his participation in the annual sessions of the Indian Science Congress. Indeed, he utilised these occasions to reflect upon the relationship between science and human development; to draw science and scientists closer to the people; and, also, to bring the people and their problems closer to the scientists.

I am much beholden to Shri Baldev Singh, who is engaged in a larger study concerning the development of science and technology in modern India, for putting together the addresses of Jawaharlal Nehru at the annual sessions of the Indian Science Congress, with a scholarly introduction. I

believe that these addresses hold many insights about the nature of science and its relationship with the development of human potentiality. It, therefore, gives me great pleasure to place them before a wider audience.

New Delhi
November 1985

RAVINDER KUMAR
Director
Nehru Memorial Museum and Library
Teen Murti House, New Delhi-110011

Preface

Jawaharlal Nehru's association with the Indian Science Congress dates from 1938, when he sent a message to the Silver Jubilee session of the Congress held at Calcutta, presumably in his capacity as Chairman of the National Planning Committee of the Indian National Congress. In this period, tne Congress ministries were in office in several provinces. He was elected to preside over the 30th session of the Indian Science Congress held at Calcutta, in January 1943. However, he could not since he was incarcerated in 1942 during the Quit India movement.

Nehru was elected President for the 34th session of the Congress held at Delhi in 1947, when he was Vice-President in the Interim Government. Thereafter, he was present at the annual sessions year after year to inaugurate or address the open session of the Science Congress—the only exception being the years of 1948 and 1961 when matters of State kept him away. In all, Nehru spoke at 15 sessions of the Science Congress, the last being on 7 October 1963, at Delhi.

Nehru invariably spoke extempore and without notes. His speeches covered a variety of subjects and conveyed his thoughts and reactions to the situation in science and society. Recordings and transcripts of eight of his speeches have been made available by the Nehru Memorial Museum and Library and the Jawaharlal Nehru Memorial Fund based on the recordings of the All India Radio. Seven summaries/speeches from proceedings of the Indian Science Congress have been reproduced here since transcripts or the recordings of these are not available. In 1962, Nehru addressed the Ceylon Association for the Advancement of Science. This Address has been included as an Appendix since it also deals with the role of science in resolving the problems of a developing society. Only minimum amount of editing has been done for the purpose of publication in order to retain as faithful a presentation as possible.

Grateful thanks are due to the Indian Science Congress Association for the use of the proceedings of the annual sessions published by them. Thanks

are also due to the staff and authorities of the Indian National Science Academy, the Nehru Memorial Museum and Library, and the Jawaharlal Nehru Memorial Fund for assistance in collection of the material. I am grateful to Professor Ravinder Kumar, Director, Nehru Memorial Museum and Library, for his constant help and cooperation.

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November 1985

BALDEV SINGH

Introduction

Jawaharlal Nehru ascribes his interest in science to his days in Cambridge as student for a science degree and later his realization, as a mature politician, that economic salvation of India's millions lay in development of science and its application to resolve the problems of ignorance, hunger, poverty and unemployment. Nehru attached great importance to the Indian Science Congress as representing Indian science and made use of the opportunity provided by its annual sessions to make public the importance he attached personally to science and its application and the commitment and support of his government for its advancement. He also used the occasions to win a popular backing for science and scientists and impressed upon the people their role in social, cultural and economic transformation of the country. On the other hand, open sessions of the Science Congress made it possible for him to reach across a broad spectrum of the Indian scientific community from the universities, institutes and laboratories, and lecture to them on their social responsibility to the Indian people in applying their knowledge, learning and skills to solution of the economic and social problems of the country; of their responsibility to develop the spirit and temper of science among the people and create a climate conducive to progress; and their ethical and moral responsibility to choose and support the right direction in application of science for human development and betterment as against its use for evil and destruction.

As early as 1938, Nehru realized the need for planning and selected a passage from Lord Rutherford's presidential address to the Silver Jubilee session of the Indian Science Congress (25th Session—1938) to stress that total planning of the socio-economic system was essential to eradicate India's backwardness. He questioned whether national planning could be done under the socio-political conditions obtaining under a colonial system when vested interests prevented ordered development. After the attainment of Independence, Nehru called upon the scientists to create the necessary mental climate and scientific temper so necessary for the

implementation of the development plans, (39th Session—1952). Later, he expressed that a number of Indian scientists had an 'ivory tower' approach and that 'scientific research work and its practical application have not been properly coordinated with the big plans of development'. (42nd Session—1955). Again, in 1958, he called upon the Indian scientist to 'play his full part and increasingly in planning and the implementation of Five Year Plans'. He was critical of the Planning Commission which was originally conceived as an expert advisory body—not to function as part of government but had become just like a wing of the government. (50th Session—1963). Since the early fifties, the Planning Commission had a scientist member but linkage between science and planning was inadequate. Nehru repeatedly stressed the need for total planning and a well coordinated and integrated approach to the scientific effort as a part of planned development.

Immediately after the formation of the Interim Government in 1946, plans were set afoot to vigorously implement the recommendations of the Industrial Research Planning Committee headed by Shanmukham Chetty (1945) to establish National Laboratories and Institutes. Nehru threw his full weight and that of the government into providing financial resources and other inputs to building 'laboratories, institutes to give opportunity to scientists and concentrate on advancement of scientific research and application of science to play a part in the world and solve economic and other problems'. (36th Session—1949). He noted that government could only give opportunities, but it was calibre which could take advantage of these opportunities. He laid great stress on quality as compared to quantity and was critical of the 'superficial work' in progress in the field of scientific research. While expressing his greatest admiration of pure research, he thought that India needed more of the application of research to the problems of human society. He expressed pride of the government in setting up of the National Laboratories which, apart from conducting research, would help in bringing about a change in mental outlook and create climate beneficial to progress. He explained his association in an administrative capacity with research organizations in that it helped them in dealing with the departments of the government. After a decade of dedication and support to science, Nehru turned somewhat critical and chastised the 'senior men' in science for not giving the fullest chance and opportunity for creative work to the younger men and women. He also felt that application of the results of scientific work was inadequate and said that 'even when fine research work is done in the practical and theoretical field, it remains in the laboratory—that is not very good.'

(49th Session – 1962). In his last address (50th Session – 1963), he made a forceful 'plea for the maximum utilization of the services of the country's gifted young scientists . . . better to give opportunities of leadership to younger people'. He also felt that 'all was not quite well with National Laboratories' if they failed to train younger scientists to fill the posts of directors on retirement of the senior men—which consequently remained vacant. Even so, Nehru was proud of the spirit of self-reliance developed in the country due to growth of science and technology. In the context of difficulties in obtaining foreign assistance for the Bokaro Steel Plant, he felt that 'Now we have advanced in science and technology enough as not to be helpless.' (50th Session—1963).

Owing to his personal interest in science Nehru took pains to familiarize himself with its progress in various fields. He also cultivated the association and friendship of a number of eminent persons in the field of science in India and abroad. But, he rightly explained that his 'interest in science arose from the social consequences of science than science itself.' (47th Session—1960). He enjoined upon Indian scientists to help to solve:

a) material problems of food and necessities of life;
b) larger problems—social, economic, psychological, etc. and finally
c) bring about a temper of science. (40th Session – 1953).

His stress on 'temper or climate of science' was at least partly intended to create the necessary environment for industrial and economic development and modernisation. The role of laboratories/institutes was seen by him not merely as centres for scientific research and its application but as foci to 'help in bringing about a scientific outlook—scientific temper, climate suitable to general progress'. On his own part, he used every occasion to explain the 'importance of science to be dinned into [the] ears of many people brought up in a different tradition.' (38th Session—1951). He also felt that 'social system and economic structure must fit in with science' and regarded 'scientists to be crusaders to better the lot of millions and peace through international co-operation'. He visualised that 'the best help the scientist can give is to try to produce that critical faculty in considering problems, the objective way of looking at things.' (40th Session—1953). From that angle he was severely critical of scientists who 'seem to keep science and what science stands for in a particular corner and not interfere with rest of our activities' and 'outside of their laboratories and lecture halls they become entirely different from what a scientist should be.' He felt that 'while a scientist may be exceedingly good at his particular kind of work, he becomes prey to prejudice in . . .

other spheres and his critical and scientific faculty does not function'. (44th Session—1957).

The social implications of the latest scientific developments, particularly in the field of atomic energy and man-made satellites, made Nehru increasingly conscious of the social responsibility of the scientists to ensure rightful utilization of the fruits of their work. Even in 1947, in his presidential address to the 34th session of the Indian Science Congress, Nehru had categorically stated that free India would co-operate internationally in science in the cause of peace and not war. Nehru did initially believe that a scientist 'pursues truth regardless of where he might reach, regardless of even humanitarian considerations. And that is right, because it is no good trying to be sentimental at the cost of truth. It won't reach you anywhere'. Even then, he felt that 'the fact remains that if human society is to survive, we have to look at it as human society and not as an abstraction.' (38th Session—1951). He felt that the State exploited scientists to wrong ends and it was very difficult to do much about it. A few years later, Nehru became much more emphatic on the role of the scientific community and questioned if they should 'become tools of others to be used for evil things.' He posed that the choice lay between undreamt of advancement of humanity and the other irretrievable disaster' and that 'all other problems discussed in conferences really pale into insignificance'. (41st Session—1954). From then on, he repeatedly dealt with the scientist's responsibility against the abuse of science. He said: 'It was scientists that place at the disposal of men vast vistas of tremendous power to be used for good or evil purposes. It was, therefore, for the scientists to help people to think rightly and move in the right directions.' (43rd Session—1956). Somewhat contrary to his earlier assertion, he said: "It is not enough for the scientists to say that they have done their job by releasing that hidden power. . . . It is not enough to say that they are to go on with this, i.e., to go on with their quest for truth whether it leads to destruction or not.' (44th Session—1957). Emphasising the positive role science could play he said that 'we have this magnificent and majestic sweep of science, advancing onwards. For the first time, in human history, mankind has the capacity and power to get rid of physical ills that the humanity suffers from, to bring about a measure of welfare to all the thousands and millions of inhabitants which nobody could dream of previously. . . .' (46th Session—1959). Nehru pleaded: 'Scientist is also a human being with human feelings and so naturally he must relate his work in some form or other with the advancement and betterment of human beings.' (47th Session—1960). He posed before scientists the peculiar situation in that: 'Just when we have the power and the ways and means at our disposal for mastering these powers of nature, of

removing the causes of hunger and poverty, then just something else comes up and diverts our energy and mind in other directions—dangerous directions.' Nehru tried to understand why the best achievement of human mind—the scientific advancement—was equally posing a threat to human survival and concluded. . . .' 'that more and more I am told that science by itself, without some kind of ethical or moral approach may lead to disaster.' (49th Session—1962).

Nehru referred to the 'conflict in the minds of scientists, how far they are justified in using their ability towards ends which might produce evil and bring destruction and devastation' (43rd Session—1956) and concluded that 'if science divorces itself completely from the realm of morality and ethics, then the power which science gives in your hands might be used for evil purposes.' (44th Session—1957). In a philosophical approach, Nehru felt that 'science has not affected the human mind as it has affected human life.' While 'advances in communications, etc., we have become one world, but human wishes, passions and prejudices are away from one world cooperation, etc.' (40th Session—1953). At the same time, 'scientific development was getting less and less free under nationalist and governmental pressures.' (42nd Session—1955). He felt that scientific temper should be one of tolerance, one of humanity and 'commended to the scientists in India and abroad Buddha's message of tolerance, against superstition, ritual and the dogma—a message in scientific spirit' (44th Session—1957), and said: 'The fact remains that a good deal of wisdom is necessary, a good deal of compassion is necessary, not merely scientific discovery and achievement.' (45th Session—1958) and 'science has also to look at the heart of the human being, at the spirit and the mind of the human being and try to integrate it with other advances it is making.' (46th Session—1959). If science had to be turned away from the course to destruction, it was necessary to combine the direction of science with the ethical and moral values of religion, as distinct from ritual, dogma, and superstition. He recapitulated the teachings of Gandhi who stressed that 'the means were as important as the ends', and for science to be used for peaceful purposes, the human mind must be turned in the direction of peace. He accepted the approach developed by Vinoba Bhave, a disciple of Gandhi, in that ' . . . he wants society to give science its due place and he wants some element of direction to it, with clogs on it to prevent it from going astray, so as to maintain some standards of human behaviour and thinking, and that he profits what he calls by spirituality.' Calling upon scientists to beware of the misuse of power which may in the ultimate effect threaten the survival of man, Nehru felt that 'perhaps we might learn not only through science today, but from the words of wisdom that have been said in many countries in the past by great men who have

influenced the conditions of humanity.' (49th Session—1962). Nehru hoped '. . . that science as it goes ahead will also encourage tolerance and compassion. Then it comes into line with the thinking of great men of old and the thinking of the modern age which, if it is fitted into the thinking of the old age, will produce wonderful results.' (50th Session—1963). Nehru called upon the Indian scientists to 'keep science out of cold war and conflict' (49th Session—1962) and that 'scientists of India should throw all their weight on the side of peace of the world.' (50th Session—1963).

BALDEV SINGH

New Delhi
November 1985

1. Message sent on the occasion of Silver Jubilee session of the Indian Science Congress held at Calcutta, 3 January 1938*

Science and Planning

Most of us, unhappily, are too much engrossed in the business of politics to pay much attention to the finer and more important aspects of life. That is natural, perhaps in a nation which struggles for national freedom and to rid itself of the bonds that prevent normal growth. Like a person in the grip of a disease, it can think only of how to gain health again, and this obsession is a barrier to the growth of culture and science. We are entangled in our innumerable problems; we are oppressed by the appalling poverty of our people. But if we had a true standard of values we would realize that the Silver Jubilee of the Indian Science Congress this year is an event of outstanding importance. For that Congress represents science, and science is the spirit of the age and the dominating factor of the modern world. Even more than the present, the future belongs to science and to those who make friends with science and seek its help for the advancement of humanity.

On this occasion of the Silver Jubilee, I should like to send my greetings to the Indian Science Congress and to the many distinguished scientists, our own countrymen and our visitors from abroad, who are assembling in Calcutta. He who was chosen to preside over this Congress session had to end his life's journey before he could come here, but that life itself of distinguished service in the cause of science and great achievement has a message for all of us. Though Lord Rutherford is not here, his written word has come to us and, through the courtesy of the Editor, I have been able to glance through his Presidential Address.

In 1938, Jawaharlal Nehru was Chairman of the National Planning Committee of the Indian National Congress. Presumably, the message was sent in that capacity. The Silver Jubilee session was to be presided over by Lord Rutherford, Nobel Laureate. On account of his death prior to the session, it was presided over by Sir James Jeans and his speech was read out.

*Jawaharlal Nehru, *The Unity of India: Collected Writings 1937-40* (London, 1941), pp. 175-77.

Though I have long been a slave driven in the chariot of Indian politics, with little leisure for other thoughts, my mind has often wandered to the days when as a student I haunted the laboratories of that home of science, Cambridge. And though circumstances made me part company with science, my thoughts turned to it with longing. In later years, through devious processes, I arrived again at science, when I realized that science was not only a pleasant diversion and abstraction, but was of the very texture of life, without which our modern world would vanish away. Politics led me to economics and this led me inevitably to science and the scientific approach to all our problems and to life itself. It was science alone that could solve these problems of hunger and poverty, of insanitation and illiteracy, of superstition and deadening custom and tradition, of vast resources running to waste, of a rich country inhabited by starving people.

I have read, therefore, with interest and appreciation Lord Rutherford's remarks on the role of science in national life and the need of training and maintaining research workers. And then I wondered how far all this was possible under our present scheme of things. Something could be done no doubt even now, but how little that is to what might and should be done. Lord Rutherford tells us of the need for national planning. I believe that without such planning little that is worth while can be done. But can this be done under present conditions, both political and social? At every step vested interests prevent planning and ordered development, and all our energy and enthusiasm is wasted because of this obstruction. Can we plan on a limited scale for limited objectives? We may do so in some measure, but immediately we come up against new problems and our plans go awry. Life is one organic whole and it cannot be separated into watertight compartments. The Mississippi Valley Committee, writing in their Letter of Transmittal to the Federal Administration of Public Works, U.S.A. refer to the planning business: 'Planning for the use and control of water is planning for most of the basic functions of the life of a nation. We cannot plan for water unless we also reconsider the relevant problems of the land. We cannot plan for water and land unless we plan for the whole people. It is of little use to control rivers unless we also master the conditions which make for the security and freedom of human life.'

And so we are driven to think of these basic conditions of human life, of the social system, the economic structure. If science is the dominating factor in modern life, then the social system and economic structure must fit in with science or it is doomed. Only then can we plan effectively and extensively. Lord Rutherford tells us of the need for cooperation between

the scientist and the industrialist. That need is obvious. So also is the need for cooperation between the scientist and the politician.

I am entirely in favour of a State organization of research. I would also like the State to send out promising Indian students in large numbers to foreign countries for scientific and technical training. For we have to build India on a scientific foundation, to develop her industries, to change the feudal character of her land system and bring her agriculture in line with modern methods, to develop the social services which she lacks so utterly today, and to do so many other things that shout out to be done. For all this we require a trained personnel.

I should like our Central and Provincial Governments to have expert boards to investigate our problems and suggest solutions. A politician dislikes and sometimes suspects the scientist and expert. But without that expert's aid that politician can achieve little.

And so I hope, with Lord Rutherford, 'that in the days to come India will again become the home of science, not only as a form of intellectual activity, but also as a means of furthering the progress of her peoples.'

Allahabad
26 December 1937

2. Presidential Address at the 34th session of the Indian Science Congress held at Delhi, 3 January 1947*

Science in the Service of the Nation

I should like to assure this Science Congress and our friends who have come from abroad that we want to cooperate with science abroad in every way to advance the cause of peace in the world, peace and progress of humanity. But while giving that undertaking and pledge, I want to make it perfectly clear that we will not coopcrate in the ways of war.

I do represent in some small measure something of the new India that you see rising about us. I think it is right and proper and very necessary for the world of science to be in intimate contact with the new India. It is also essential that new India should also come in intimate contact with the world of science. Because, if science—whatever progress it may make—is isolated from the living currents, it will not go very far.

If the new currents of renascent India go along lines that are not lines of science, then they too will go into a blind alley. Therefore it becomes essential that the two must march together.

Many of you are aware of what has been happening in India during the last quarter of a century and much more recently. A person like me who is not exactly a man of politics has to take an intimate part in political activity. I have often asked myself the question why this is so. Why should I go into politics ? It is so because it is not possible to progress in any field, more particularly in the field of science, until you remove the vast number of fetters which prevent people from functioning as they ought to.

Jawaharlal Nehru had been invited to preside over the 30th session of the Indian Science Congress in 1943 at Calcutta. However, he could not do so because of his incarceration and Dr. D.N. Wadia F.R.S. the President for 1942, carried on the duties for 1943 also. Jawaharlal Nehru was again invited in 1947, when he was Vice-President in the Interim Government.

*Proceedings of the 34th Indian Science Congress, Part II—Presidential Address. pp. 1-4; *The Hindustan Times*, 4 January 1947, Science Congress Supplement.

I do hope that now, when India is on the verge of Independence and science in India too is coming of age, it will try to solve the problems of new India by rapid, planned development on all sectors and try to make her more and more scientifically minded.

Surely, science is not merely an individual's search for truth. It is something infinitely more than that if it worked for the community. Its objective must be to remove the ills of the community. It must have a social objective before it. For a hungry man or a hungry woman, truth has little meaning. He wants food. For a hungry man, God has no meaning. He wants food. And India is a hungry starving country and to talk of truth and God and even of many of the fine things of life to the millions who are starving is a mockery. We have to find food for them, clothing, housing, education, health and so on—all the absolute necessaries of life that every man should possess. When we have done that we can philosophise and think of God. So, science must think in terms of the 400 million persons in India. Obviously, you can only think in those terms and work along those lines on the wider scale of coordinated planning.

I hope that the Science Congress will devote itself to this task and not wait merely for the Government to take action. Governments may be good and may be bad, but governments normally are very slow and the only thing that moves them is some immediate public outcry which affects their future indirectly. Therefore, I should discourage among the scientists a reliance always on what Government may or may not do.

Naturally, they have a right to expect things from the Government, and, speaking just as one member of the present Government of India—speaking, may be, partly for my colleagues but largely for myself—I may say that we are intensely interested in scientific development in India and we shall do everything in our power to encourage scientific research. We should like to tap all the latent scientific talent in the country and to give it opportunities for growth and service to the community.

What the future will bring I do not know; I can neither foretell the future, nor have I any authority to bind my country down to what it may or may not do in the future, but in these days, so soon after the last war, when people again think of wars and when scientists are yoked into work in preparation for future wars, I think it is desirable and necessary that men and women of science should also think about the way they are often misused and exploited for base ends and should make it clear that they do not want to be so exploited.

Anyway, I do hope that India in future will not allow herself to be dragged into wars which are likely to be far more terrible than any that we have experienced thus far.

I say that, and yet I know how difficult it is for a line to be drawn between scientific work for peace and for war. This great force—atomic energy—that has suddenly come through scientific research may be used for war or may be used for peace. We cannot neglect it because it might be used for war; obviously, in India, we want to develop it, and we will develop it to the fullest. Fortunately, we have eminent scientists here who can do so. We shall develop it, I hope, in cooperation with the rest of the world and for peaceful purposes.

It is a tragedy that, when these enormous forces are available in the world for beneficent purposes and for raising human standards to undreamt of heights, people should still think of war and conflict and should still maintain economic and social structures which promote monopoly and create differences in standards of wealth between various groups and peoples. It is a tragedy, whatever other people might say about it, and no man of science should accept it as a right ordering of events. So in India today, while we are busy with our own political and economic problems, we have inevitably begun to think more and more of the vaster problems that face us and in the decision of which science must inevitably play a big part.

I invite all of you who are present here, young men and old in the field of science in India, to think in these larger terms of India's future and become crusaders for a rapid bettering of the 400 millions in India, and crusaders of peace in India and the world and international cooperation for peace and progress.

I do believe firmly that the only right approach to the world problems and to our national problems is the approach to science; that is to say, of the spirit of science and method of science. Somehow eminent men of science when they come out of their study or laboratory forget the approach and method of science in other fields of life. While in our particular field we may be meticulously careful when we come out into the social and economic fields, we forget the scientific approach. I firmly believe that it is through the method and spirit of science that we can ultimately solve our problems. All over the world it is because we forget the scientific approach that many of our troubles arise.

While you must discuss your particular problems I want that you should not ignore the picture as a whole. There has been a tendency in the last few generations towards greater and greater specialization. It has yielded rich results but it has led to the narrowing of vision of the average person. Perhaps some of our troubles are due to this fact, and also because you can never understand a picture fully unless you have a conception of the whole.

You cannot divorce science from social and political happenings and from the economic structure of the world. Therefore, perhaps it is time that science developed a certain philosophy and unity, if I may put it so. It had this quality in the olden days when science presented a smaller picture than it does now. That gave a certain organic unity to it. Now with each department going its own way, it has become difficult. I do think that in the present circumstances of the world we should develop something of that unity of outlook and appreciation of the world problems. Nearly two years ago a bomb burst in Hiroshima. It created inevitably a great deal of excitement. It seemed to me to herald all kinds of enormous changes, constructive as well as destructive. It produced a conflict in people's minds as to where we were going, rather where civilization was going, what things could happen. Whether it was necessary or not I do not know, but obviously it led to one question which troubled a large number of people. The question was whether to gain a certain end, any means and every means possible should be adopted; because the means adopted at Hiroshima were horrible beyond words. May be the end desired was achieved, but it is a question which every scientist has to consider.

Science has two faces like Janus: science has its destructive side and a constructive, creative side. Both have gone on side by side and both still go on. No one knows which will ultimately triumph. Hiroshima became a symbol of this conflict and, in spite of all the decisions of the Atomic Energy Commission of the United Nations—and we welcome those decisions, of course, in so far as they go—the doubt remains in one's mind as to where we are speeding.

On the other hand, apart from the atomic bomb aspect of it, we are obviously on the threshold of a new age in the sense of enormous power resources being put at the disposal of humanity and the community. Will this new age change—and I think it will change enormously the whole structure of society! My mind goes back to the time when gun powder burst upon the world. Gunpowder at any rate pushed the Middle Ages away completely and fairly rapidly, in course of time, brought or helped to bring about a new political and economic structure.

Of course, there were many forces at work. Nevertheless, gunpowder did produce that powerful effect on society and ultimately out of the feudal order a new capitalist order gradually developed. Now I wonder whether this so-called atomic bomb is not also the herald of a new age, of a new structure of society, which has to be established in order to fit in with present conditions. All these thoughts come to my mind because I want to understand this picture in this broad way and not to be lost in the argument. I myself am convinced that there is going to be no very great progress either in science or in other ways unless certain fundamental changes take place in the social structure. Here in India we have a peculiar structure. You can see in different places different types of social structures. You can see social structures approximating to those in the early Middle Ages as well as to those of the 20th century. This picture which is rapidly changing even the 20th century structure does not seem to answer the present needs.

So personally I feel convinced that a radical change must come, a radical change in the direction of allowing the whole community to develop and not only a small group on top. I do not think that the enormous big projects that we have in view in India can really succeed without the cooperation of the people at large. I think we shall be able to turn these vital currents in the right direction and mould them on scientific lines.

I do not know what line India will take when she is independent. I know the line I would like her to take and I shall do my utmost to that end. When this mighty force becomes free suddenly, there may be some disorder. When an ancient tree is uprooted, it shakes the ground round about it, and today many old trees are being uprooted in India. An enormous new energy will be released when these hundreds of millions of people are free. What direction they will take is difficult to say.

Many of us are naturally tremendously worried with some events that are happening in India. Many of our friends from abroad must also have their minds filled with the picture of conflict in India because that conflict, bad as it is in India, is magnified a hundred fold when it crosses the seas and people seem to think that the sole or main occupation of the people in India today is to cut each other's throat.

While conditions are in some respects not at all good, still when we think of the brighter picture of India whose people after having been largely static for many years are in motion today, then those conflicts become rather petty in their perspective. When a whole people are on the move,

INDIAN SCIENCE CONGRESS: 36th Session, Allahabad, 1949

Jawaharlal Nehru delivering the Inaugural Address. Also in the picture are K.S. Krishnan, Sarojini Naidu and Govind Ballabh Pant (left to right)

they go astray here and there, but the main thing is the vitality they possess and, even if they go astray, they will come back to the right path.

That is the real thing, the encouraging thing, that makes one certain that India has a tremendous future in store for her and that, as soon as we get over our present troubles, there will be a flowering of science and other activities in India which will probably astonish the world.

That is inevitable in this mighty period of transition. What is far more important is how we are going to develop. The special job of the scientist is to lead, to develop and to coordinate.

If this country is going to develop, as it is going to, that development is not going to take place in an isolated way; it must be coordinated, it must be planned and it must be related. Unless this is done, you cannot go far.

The first thing that we must realize is the energy of the people. Secondly, we must provide opportunities for them to train themselves. There would be a tremendous amount of wastage unless people are trained. Thus far, the Government of India have been singularly lacking in any planning or any coordination. Each department thinks for itself regardless of what others are doing. Unless there is coordination, there will be bottlenecks and schemes will come to nothing. So it has become essential to think in terms of large-scale coordinated planning in which every sphere of national life and economy is considered, and fitted into the picture. An attempt was made by the National Planning Committee, but unfortunately owing to political happenings that Committee could not function for long periods at a time.

Some attempt is being made gradually to work towards that end. That will involve first of all a clear enumeration of the objectives of planning and of the machinery of planning. Then the plan itself will have to be gradually worked out. That plan will have to be considered and examined from time to time and varied in order to fit in with the changing circumstances. For unless there is a carefully planned approach and unless the plan is made by scientists and on scientific lines, I do not think it will take us very far.

The first objective, it seems to me, from any point of view and more especially from the point of view of science, is to help in the building of a free and self-reliant India. India today has made its mark in the world of science, more especially in theoretical physics and some other departments also. We have done well when we have hardly tapped the talent in India.

We have only scratched the barest surface of the Indian people and yet we have done tolerably well, and now, when I think of what we can do, and will no doubt do, when we open the doors of opportunity to a large number of people in India, then the kind of picture I see rather overwhelms me. If we could tap, say, even five per cent of the latent talent in India for scientific purposes, we could have a host of scientists in India.

Today, of course, we have tapped only less than one per cent of our talent. To open the doors of opportunity and to build a political and social system which allows people to have the capacity to develop and function for the good of the community should be our main aim.

I want to put this aspect of our national movement before you. It aims to open the doors of opportunity for everyone as far as possible so that he can go as far as he can and be able not only to do good to himself but to the community. It is for this reason that a large number of us who might otherwise have functioned in other fields and who may even now function in other fields when the chance comes have largely confined our activities intensively to the political field.

It is a great pleasure for us to meet together and to make people realize—I hope that at least scientists realize—that science is one all over the world. While we may inevitably function in national spheres in many other ways, science is international and should have an international outlook and should gradually change national outlook into international.

I hope the visit of scientists from abroad will bear out the truth of this statement and will make our people who, owing to their peculiar circumstances, are intensely nationalistic, realize that science is international. I welcome the delegates from the U.K., the U.S.A., China, Canada and France.

I am sorry that Soviet delegates have not yet arrived. They will be here if not this evening then tomorrow so that we may renew contacts with them also. Moscow may be far from here, but the Soviet Union and India are neighbours. Their boundaries almost touch one another and we shall have a great deal to do as neighbours with each other.

I hope this Science Congress, meeting at a time which in India's history is a very significant time, will prove also very significant in the development of science in India.

3. Inaugural Address at the 36th session of the Indian Science Congress held at Allahabad, 3 January 1949*

Jawaharlal Nehru said: You have been welcomed by the Governor and by the Premier of this province and I have come here on behalf of the Government of India to bid you a warm welcome to this Science Congress and to assure you, if an assurance is needed, of our interest in your work and achievements. I am also here in my personal capacity as a citizen of Allahabad to express my pleasure at the meeting of this distinguished Congress in my home-town of Allahabad. (Applause). Reference has been made to this city as a centre of intellectuality and as a place where for ages past people came for learning and also as a place where people come to die. (Laughter). When these compliments are paid to this city of Allahabad, I do not take them at their face value. So far as the question of dying is concerned, I prefer to live in a place where people go to live and not to die. But when Allahabad is said to be the seat of intellectuality, it almost leads me to think that it has no other claim left having been deprived of most of the other things that originally belonged to her. Fortunately, the University is still there in Allahabad and presumably will continue. Fortunately, the rivers *Ganga* and *Jamuna* are also here and presumably will continue. (Laughter). Therefore, in the final analysis, the citizens of Allahabad need not despair and so long as we have *Ganga* and *Jamuna* we can carry on.

Nehru then paid his tribute to one of the most eminent Indian scientists whom they were happy to see amidst them, Dr. C.V. Raman, who had recently celebrated his 60th birthday. (Applause). Sixty years was not very much in a man's life and they hoped that he would be spared for many more years of service in the cause of science and in the cause of India. (Applause).

The session was presided over by Sir K.S. Krishnan F.R.S. Jawaharlal Nehru delivered his Inaugural Address extempore and at length. Only a summary from stenographer's notes is available.

*Proceedings of the 36th Indian Science Congress, Part I, pp. 31-5.

Proceeding, Pandit Nehru said that undoubtedly science, had done tremendous good for the world and in India, they had to concentrate on the advancement of scientific research and the application of science. The Government was building up laboratories, institutes and the like to give opportunities to their youths to further the cause of science, because they realized that a country must be good in regard to scientific research and application of science, if it was to play its proper part in the world and because they also realized that they could not solve their problems, economic or otherwise, without the help of science. Science must progress and they, as a Government, were certainly going to do their utmost to give it the opportunity to progress. After all, they could only give the opportunity but ultimately it was the human being who counted in the institute and not the money which flowed into it from the exchequer. If India had human beings of the right calibre who could take advantage of these opportunities, it would be well and good. He was quite convinced that many of their younger men in the scientific field were of the right calibre and were bound to make good, if they were given the opportunities.

Pandit Nehru said that he had come to think that quality was far more important than quantity in scientific knowledge. It was true that out of quantity came quality, or the opportunity came if the masses in India had sufficient opportunities for their training and he had no doubt that a vast number of competent, able and talented young men and women would come out in every field of activity and more especially in science. Giving them opportunity was where quantity came in, but if they were content with quantity only, then he feared they would remain secondary in the field of science. Therefore, quality became essential and he laid stress on this because he feared that during the past two or three years when they talked so much on scientific advance they had laid stress on quantity more than on quality.

As he had said the other day at Bangalore, Pandit Nehru was not satisfied with the quality and output in India in the field of science. Frankly speaking, he thought that they were not quite so big in the scientific field as they said they were. Somehow they were getting lost in smaller things, in mutual debates and arguments and not concentrating on that type of scientific work which was of a basic nature and out of which all other types of scientific activities grew. He liked to see more fundamental work and less of what he might call rather superficial work, in fact, more of that spirit of true science which should animate and inspire them and lead them to bigger achievements.

Pandit Nehru said that the problems they had to face in the world and in India today were overwhelming. In India the economic problem was dominant and they had to think of ways to solve it. Unfortunately, even the cause of science was suffering in India because of their economic difficulties. The economic problem was a big one but it was not directly concerned with their work in the Science Congress.

What should scientists do and to what end should they work? Dealing with this question, Pandit Nehru said that obviously the men of the calibre must be given a highest chance to work as they chose and it was no good third-rate men trying to do the work of first-rate men. Really, first-rate men in the field of science and indeed in any field must be given amount of latitude to do just a fair what they liked. They might fail or might succeed, but if they are not they given this latitude, they might miss something very great. The problem that troubled him was how, in the final analysis, science was helping them today in the solution not of the thousand and one problems of the world but of what he would call the one single fundamental problem of this world. In spite of its very great scientific achievements today, the world was obviously in a bad way and there was something very wrong about it. There were plenty of men of ability and talent and even genius, plenty of men of goodwill and yet the world went wrong.

What were they going to do about it? People said they were in an age of transition, but every age was an age of transition. What did men of science propose to do about it? Whether they were scientists or not, they could not escape the consequences of this conflict of spirit that was going on all over the world and certainly in India. He did not think that mere scientific advance, however, great it might be, gave the answer to this major problem. Indeed, scientific advance rather intensified that problem unless they found some other ways and means of solving it. The shake-up of the world, when industrial civilization began about 200 years ago had continued in varying degrees. As soon as places where industrialisation had not spread became fewer and fewer, the crisis became more and more acute. It led to the First World War, which led again in a more acute form to the Second World War and today it was leading to some frightful catastrophe. The lack of adjustment caused by industrialisation spreading and not being properly balanced with other conditions, had led to the crisis that enveloped them. The odd thing was that scientists added to that crisis by finding out more and more ways of advance in this particular field. Unless the scientist found out ways of balancing that advance, he added to the crisis and the result was that he sped the possible destruction of his own work in a big way.

How exactly any scientist was going to deal with this tremendous problem he did not know, said Pandit Nehru. A scientist, like any other person must develop some kind of organic knowledge of human history and human advance. He must develop some perspective and try to see how things had developed, how humanity had been affected in its various phases of existence, how it had profited by science and how it had not profited; not because of lack of science but because of a lack of adjustment of what science produced. They had numerous examples of the highest scientific advance in a country being utilised for low purposes and not the right purposes. What he suggested, said Pandit Nehru, was that while they must necessarily specialize, they must look at their problem in its wider perspective as part of the human problem, as a part in the historical perspective as well as in the human perspective and then perhaps they might see it in its right place. Thus when they made their new discoveries, they might also think of the factors of balancing their discoveries. There should be an attempt to preserve everything that they had gained today and to add to it. There should be a further attempt to balance their gains in various ways, in the social and economic spheres and in the realm of spirit.

I would like you scientists to think about this aspect of the problem, because it affects all of us very greatly and all our achievements may be swept away by the great world disasters and catastrophes, simply because we work in our grooves and others work in their grooves and great forces work in contrary directions and are not balanced. The Governor appealed to you, men of science, not to help forces of evil and destruction. This applies to each one of us, wherever we may be and we should endeavour not to ally ourselves in any way with the forces of evil and destruction. It is no good getting excited against this nation or that as most people do. Most people and most nations are alike more or less. They have their good and bad points. In a way, the problem has to be looked at impersonally, objectively and scientifically to understand the various forces that are at work today in the world, know men's minds, understand them and try to help the right forces and the right urges.

Pandit Nehru, referring to the development of communications, said that air travel took them quickly from one part of the world to another and there were no political frontiers in the air. It was the mind of man that had achieved everything and developed everything. The mind of man was still probing into the mysteries of nature and the universe and probing with success. Most of the people in most parts of the world had not quite adapted themselves to the great achievements of science which they used daily. They used them just as so many people used the aeroplane in India.

But they were as far removed from everything which an aeroplane signified or meant as anything could possibly be.

Pandit Nehru said that today there was very little poise left in the nations and even statesmen went about openly cursing each other in conferences and in other places, with the result that they lived in an atmosphere of extreme tension with possibilities of wars or domestic conflict. Surely there was something very wrong about the world where all these conflicts and tensions took place and if they did not understand what was wrong and help to the extent they could in setting it right, they were living in an artificial atmosphere. It should be the job of science or particularly some departments of science to try to solve these problems by developing to some extent a philosopher's bias in addition to the scientist's outlook. They required in every field of life, especially for men at the top, a touch of philosophy, not too much of metaphysics which was most dangerous, but understanding problems of human life and applying science to the solution of those problems. (Cheers). This was not merely a question for the politician or the scientist, it was a question for every sensitive thinking human being. Obviously, scientists were both sensitive and thinking and therefore, it was a question for them. They put up a vast number of laboratories and produced results which helped them to meet this problem or that problem, and then some overwhelming catastrophe came which put an end to their laboratories and to their work. It was an astounding position and he could hazard a few guesses as to the reason for it. A high degree of specialization had produced highly talented persons and even a man of genius but often enough a person who was a very bad citizen in the real sense of the word. Each person worked in his special groove, but there was very little of coordination between different grooves and all his work was upset from time to time by great forces of which he had no understanding, because he did not even try to understand them as they fell outside his groove. Pandit Nehru urged that they had to understand these great forces, control them or divert them along right channels. If there was a conflict today in the world between forces of destruction and forces of construction, they must try to encourage and support and help in every way the latter.

4. Speech at the 37th session of the Indian Science Congress held at Poona, 2 January 1950*

Prime Minister Hon'ble Pandit Jawaharlal Nehru, while addressing the Conference paid tributes to the visiting scientists and said:
Ladies and Gentlemen,

These eminent men and women should not confine themselves to the deliberations of the Conference alone but should talk to our youth and make them feel the international quality of science. Men and women of science must inculcate a spirit of international outlook in the minds of India's youth, who would have to bear the burden of future administration of India.

In the olden days the men of knowledge had had to go to those in power for their maintenance. Their works had to be dedicated to those who dominated that age. But now the scientist stood on the same footing as the politician. The scientists having become fairly important, the politician, whether he knew anything about science or not now praised science all the time.

Whether we understand science or not we are now certainly very much conscious of the fact that modern world is dominated by science. Today we want the scientist to help us in our jobs. But we do not like his suggestions and even begin to think he is interfering too much in other people's way of doing things. The politician neither follows the advice given to him by the scientist nor follows his own way. It is obvious that in India and many other countries round about, this is what is happening.

We have certain primary problems of great importance. Many other countries, whatever may be their social and economic problems are having fairly high standards of living. In these countries, where the necessities of

Jawaharlal Nehru addressed the open session of the Congress followed by the Presidential Address by Prof. P.C. Mahalanobis F.R.S. entitled 'Why Statistics?'
*Proceedings of the 37th Indian Science Congress, Part I, pp. 29-31.

INDIAN SCIENCE CONGRESS: 38th Session, Bangalore, 1951

Sitting: (1) B. Mukerji (2) C.V. Raman (3) M.S. Thacker (4) H.C. Dasappa (5) H.J. Bhaba (6) Jawaharlal Nehru (7) H.H. The Maharaja of Mysore (8) V.N. Chandavarkar (9) P.C. Mahalanobis (10) S.S. Bhatnagar (11) B.L. Manjunath (12) J.C. Ghosh

Standing: (1st Row) (1) B.R. Mackay (2) M.N. Saha (3) L.I. Fermor (4) C. Racine (5) C.S. Venkateswaran (6) S.M. Banerjee (7) P.C. Guha (8) G. Sankaran (9) B.N. Prasad (10) B.B. Mundkur (11) L. Rama Rao (12) S.P. Agharkar (13) C.S. Ghosh (14) R.S. Krishnan (15) A.R. Sinha (16) B Sanjiva Rao

(2nd Row) (1) A.M. Heron (2) J.N. Mukherjee (3) S.N. Bose (4) B.C. Guha (5) J.K. Basu (6) R.C. Shah (7) S.L. Hora (8) A.C. Ukil (9) J.L. Bhaduri (10) A.M.N. Ghosh (11) J.B. Auden (12) K.L. De (13) B.K. Majumdar (14) H.S. Jois (15) S.S. Sircar

life are provided to a great measure, the primary problems do not assume as great an importance as in our country. The people and the governments of those countries can think of peace and war, prepare for war and talk of peace as the case may be. In fact, in some places the two things go together.

In an underdeveloped country like India primary needs were such that they could not talk in any other terms except financial stringency and balancing the economy. Situated as we are, our basic desire is not to get entangled in the tangled web of power politics. Friction caused by power politics will lead to war. Everything we desire and work for in India requires peace and a calm atmosphere to strive for the development of the country so that we may fulfil those primary needs of the people.

There is no doubt that in India there is a growing realization of this fact that the politician and the scientist should work in close cooperation. The solution of all our social and economic problems depends on this cooperation and no state can afford to ignore this fact.

We got power, and it was followed by difficulties and problems of extreme urgency. Whether we have faced these difficulties adequately or not, we were compelled to put aside vague conceptions and proceed with the urgent need of the hour. Today unexpected pressure has been brought to bear upon us in economic and other spheres with the result that we have to think entirely in terms of rigid economy. All these difficulties came when we had thought of a vast number of schemes to raise standards in India. In many ways we in India are at a very low level. We have to solve our problems and overcome our difficulties. For this we want the assistance of scientists in as practical a way, as urgent a way as possible.

In India, we were dominated by a lawyer's mentality and more lately by a classical philosopher's. Latest, in the picture was the businessman's mentality. The lawyer still played a fairly important part in Indian politics. But neither the lawyer nor the classical philosopher can solve our problems. Present problems of India are to be tackled not with the approach of a lawyer or a classical philosopher but with a partly scientific and partly engineering approach. I doubt very much if a businessman with his limited outlook can play any part at all. Our problems are to be tackled now with the spirit of a man who does things himself and does not sit in the office ordering people about.

I appeal to you not to think too much of science, metaphysics or hypothetical theories but to become objective realists. I also appeal to

young men and women of India to give up their nationalist sentiments now that we are free from colonial rule and are a sovereign nation and channelise their energies into constructive spheres. But if we still continue to show our nationalist sentiment then our country or for that matter any other nation, cannot aspire to a great future or an honoured place in the comity of nations.

5. Inaugural Address at the 38th session of the Indian Science Congress held at Bangalore, 2 January 1951*

Your Highness, Mr. President and Friends:

I have to face an initial difficulty and that is this, that, while your Highness has asked me to inaugurate this Conference, at the same time, it has been hinted to me that it would be better if I restrained myself at this stage and spoke later. (Laughter). So, it has been decided, I hope, you will agree with this, that I should to a large extent restrain myself and speak later. But, for the present, I shall just say a few words in order to inaugurate the Conference. That means in a sense that two speeches are inflicted upon you.

I should just like to say at this stage, how happy I am to be here at this session of the Science Congress and as your Highness has said, that I made a rather special effort to come here and I am leaving within a few hours for England. And, I want to tell you that, as you must know, that certain changes have taken place recently in the Central Government. Perhaps you know, that a new ministry called the Ministry of Natural Resources and Scientific Research has been started. That itself, I hope, will be welcomed by this Congress and the eminent scientists who are here.

Ever since my association with the Government, I have felt the need for encouraging scientific research and scientific work and have, for that purpose, associated myself with various important organizations, like the Board of Scientific and Industrial Research of which I was and am the Chairman. I have also been closely associated with the Atomic Energy Commission. Well, none of you need think that I know very much about science or atomic energy. But, I felt and others agreed with me that it is

Jawaharlal Nehru delivered a brief Inaugural Address followed by the Presidential Address by Dr. Homi J. Bhabha F.R.S. on 'The Present Concept of the Physical World'. Later, Nehru delivered a speech after performing the opening ceremony of the new Electrical Communication Engineering Building of the Indian Institute of Science, Bangalore.

*Proceedings of the 38th Indian Science Congress, Part I, pp. 28-33; Transcript of the speech. Nehru Memorial Museum and Library, Teen Murti House, New Delhi.

helpful sometimes for me to play the part of a showboy. And my association, therefore, did help these organizations in their dealings with the Government, when in fact, I have also been during these past three years, Minister in charge of Scientific Research. Now that a new Ministry has been formed of Natural Resources and Scientific Research, that will include, of course, the Department of Scientific Research plus also many other important departments and activities, and my very old friend and colleague Shri Sri Prakasa, will be in charge of it. That does not mean that I cease to be in charge of anything and, in a sense, if I may say so, with all respect to my colleague Sri Prakasaji, my overall charge continues of scientific work and I propose to continue to take deep interest in it.

My interest, as I said, largely consists of trying to make the Indian people, and even the Government of India conscious of scientific work and the necessity for it. Because really the work is not done by me but by the eminent men, my colleagues, who are sitting round about here and who have helped in giving such a great place to science in India. So, I wish to assure you that in so far as I am concerned, I shall help in every way the progress of scientific research and the application of science to our problems in India.

Dr. Bhatnagar has been very intimately connected with all this work as Secretary of the Department of Scientific Research. He will continue that association, but in a larger field now, and I am quite sure, that that will also be of great benefit to science. I am particularly happy to be here today because this session of the Science Congress is going to be presided over by my dear friend and colleague Dr. Bhabha. Whose, it is not for me to tell you, of not only his achievements, but his promise for the future, which are both great. But, it has been a pleasure to me to work with him in various ways and more specially in the Atomic Energy Commission.

I now proceed to inaugurate the 38th session of the Indian Science Congress and the 1st session of the Pan Indian Ocean Science Congress.

Speech after declaring open the new building of Electrical Communication Engineering Department of the Indian Institute of Science

Your Highness, Mr. President and Friends:

I have yet to perform another opening ceremony. (Laughter). That will be done at a distance and I will turn a switch on here to open the new Electrical Communication Engineering Building of which two years ago, I am reminded, I laid the foundation stone. (Laughter). Then, I shall do so!

(Clapping). You have just been listening to Dr. Homi Bhabha's address and, no doubt, all of you found it very interesting, as I did. All these are very fascinating subjects and yet I was trying to correlate what he said and the subject to the kind of problems we have to face. I am quite certain that these things are not unrelated to each other, although the relation may not be obvious. But then, today, when we have to face all kinds of rather urgent and immediate problems, how exactly do we bring about this relation—not in regard to this particular subject but in regard to almost all your activities of scientific research to the problems of the day? Now, I have the greatest admiration of what might be called pure research. I think that is essential and out of it come out many practical applications, even though they might not have been previously thought of. So, it is not with any idea of lessening the importance of pure research that I am saying.

Inevitably, a person like me who is concerned with day-to-day problems of great importance has always to think a little less of pure research but more of the application of research to the problem of human society. More particularly today, that is in the present context of things one has to think exactly where we are heading to in the world and what science has to offer in regard to it. Science certainly has done much to, well, make conditions more difficult. That is to say, make the possibility of war far more terrible than at any time previously. Now the scientist, as a scientist, I suppose, is not entirely a human being. That is to say, he pursues truth regardless of what the result he might reach, regardless even of humanitarian considerations. And that is right because it is no good trying to become sentimental at the cost of truth. That won't lead you anywhere. But the fact remains that if human society is to survive, we have to look at it as a human society and not as an abstraction.

Some of you, gentlemen, who have come from foreign countries and have been here a day or two, in Bangalore or elsewhere in India will have seen something of the face of India—a little – a very little. You may have seen even in Bangalore large numbers of our people and formed some impression about them. I do not know what your impressions are? But, I have innumerable impressions of the face of India and the faces of our people, and all the time I am oppressed by the thought of these people – of what they—what one should do for them,– what they want—what they need immediately. If you saw yesterday a fairly considerable number of them, after we arrived here; you would have seen the enthusiasm, their cheerful faces, the bright-eyed children, and all that—as I saw them—and although I have seen those any number of times during the last 30 years or so—that always moved me greatly. It moves me for a variety of reasons

because my life and our lives have been wrapped up with these people's lives in a large measure and their hopes and fears. Also for a personal reason, because they have done me a very great honour of putting their faith in me and showing their affection for me. Now that is a great burden, if I may say so, naturally it is a thing which gives one great pleasure—but it is a very great burden which one does not quite know how to discharge. I suggest this to you because you as scientists are very intimately concerned with this problem. You may indulge in the pure science or applied science—even human beings cannot escape it. But, even more so as scientists, you should consider this matter. It is a great matter affecting all of us all over the world.

It is a strange thing, that here we meet and eminent scientists come from different parts of the world and, for the moment you forget your national boundaries and you confer together as colleagues and co-workers in the cause of truth, in the cause of human progress and you may achieve certain results. And yet, somehow or other, national barriers come in, national hatreds and animosities and ambitions and then they not only come in the way of work but destroy much that you do.

Now, how are we to meet the situation? I am a politician, to deal with these problems of day to day. I have to deal with human beings in the mass as well as individuals, human passions and it amazes me how utterly irrational human beings are both as individuals and in the mass. We call ourselves scientists or living in a scientist age. All the world today is, shows what science can do. Nevertheless, it is astonishing how far from what might be called scientific temper or scientific outlook—we are all of us whatever we might be, although we might profit by the latest advances of science.

Now that means that there is a kind of a race between the good effects of science which are obvious and the evil effects of scientific development—not of science—of scientific application—which are equally obvious. And one does not quite know which will win in the end. It is almost becoming—to have any purpose in life—it is almost becoming if I may say so, an act of faith, because one does not see much logic about it from the way men behave, nations behave and statesmen behave. So how are we to deal with this, not on the political plane—leave that to the politician—but on the scientific plane because men of science are presumed to be dispassionate and objective observers—are presumed to have some poise and not to allow themselves to be swept away by passions and prejudices? How are you then going to deal with the situation? You may, of course, you do serve your various States in various capacities and, sometimes, your

abilities are taken advantage of by the State for purposes which probably you do not approve of or admire. In other words, you are exploited for wrong ends by the State and yet it is very difficult for you, of course, to do much about it. Because the machine of the State becomes bigger and bigger—we may call it a democracy or we may call it by some other name—but it is a huge machine with its own momentum which goes this way or that way and carries everybody with it, whether they want to or not. Now I am not offering any kind of a solution to you of this problem, but I do feel that every thinking human being and more specially every scientist should consider this as a primary problem.

How to deal with this, not particular question of the day. I am not talking about that, but rather the approach to such questions. A day or two ago, was it the night before last? I was broadcasting and I said something about the temper of a people and an individual. Now, I think, if I may say so, that there is a great deal of importance to the temper or approach to a problem—whether it is by a nation, or by individual or group. And what seems to me wrong today at least—and one of the principal things that is wrong, leading us into greater and greater difficulties. It is this, the present day temper all over the world, which is, I regret to say, encouraged both by politicians and by the press in many countries. It is a deliberate temper not to win over people but to add to hostilities.

Obviously, that is not the way to solve a problem. It is the way of solution by force. Force I do not rule out. Force, one cannot rule out. I am no pacifist. For a variety of reasons, chiefly practical, though I want peace, but as Prime Minister, I keep up and help in maintaining armies in India—an Air Force—and a Navy, etc. as efficient as we can make them. So, it is not from that point of view of pacifism that I am talking, but rather from the point of view of trying to understand and grasp the present-day problems. Go slowly, if you like but certainly go towards some kind of solution of them, because of one thing I am utterly convinced that there is no solution by mere war. Now, being convinced of that, one should try to find some way other than that, because that is no way. If I am compelled, in self-defence, I use my armies; of course, I use every method that I can. That is a different matter because submission or surrender to what is definitely evil is always bad. Now, in this connection, if I may remind you of what people forget because people's memories are short, to remind you of the basic thing that Mr. Gandhi stood for. Mr. Gandhi stood for a million things. He was a man of infinite variety, and he initiated and took part in innumerable activities. And you can see many facets of his life and call them most important—that depends on you. But

it seems to me that the basic thing he stood for was that you must not submit to evil—you must resist it—resist it despite any consequences. At the same time, you must resist it in a particular way. You must try to win over your opponent—fight him also in a particular way, but win him over. Now it is difficult to combine these two processes because when once you are in a mood to combat to fight, then that mood leads to greater hostility of mind and an attempt to run down and abuse your opponent as much as possible. And that results in your going farther and farther away from the solution of the problem except by utter and absolute compulsion on the other party. That may be a possible solution although the past two generations have shown that, that is no solution except in a very small way, when you are—and when a very big party is dealing with a very small party—even then, it is doubtful if it is solves any problem, but apparently it does for the moment. But, when the parties are more or less evenly matched, then it is no solution. It is only a very large scale destruction and ruin for all concerned.

Now it surprises me, not that in the context of today people should not, should prepare in a military sense, every person who is concerned with the safety of his country has to do that, one cannot take risks. But, what surprises me is the manner in which one country approaches to another country in these days, the manner in which statesmen of high degree talk to each other.

It is said that we have come to the days of open diplomacy. Well, we know a great deal about the evils of secret diplomacy in the past, but one is inclined to think that anything would have been better than the open diplomacy, of today, which consists often enough in open abuse of each other. So I am led to think that, apart from our objectives—and we all talk of noble objectives of peace—it is at least as important for all of us, in our individual lives, as in the larger national and international life, to pay attention to the manner of doing things, as much to the thing we aim at. To put it in a different way—on a slightly different idea—again to go back to Mr. Gandhi—that means are always, as important as ends. That was the basic lesson of his life, I think, that means are as important as ends. Your ends may be noble and good, but if you adopt wrong means, you don't reach that end simply; you have taken another path which does not lead to it although you may be talking about it.

I see today people shouting about peace, and I have no doubt that the vast majority of mankind wants peace, per-eminently, if you like, for selfish reasons, without any idealistic reasons. People talk about peace and yet in talking about peace not only is their manner most warlike but their methods are even more warlike and peace becomes a prostituted word. It

has no meaning left, when you use it really, for purposes of war. Now, how can you get peace if you are aiming at war all the time, thinking of war, talking of war and exploiting the word peace for that purpose? We have peace conferences where the most violent discourses are made in terms of war. Well, I just do not understand how you can reach peace if you travel that way. So, it comes to this, that, while you, scientists are rightly concerned with the concept of the physical world and all kinds of basic things which are highly important and which ultimately affect human thinking, human philosophy; nevertheless, it becomes important that we should understand a little more of the human being, the mind of the human being, of the individual and the mass, and try in some slight degree to control the minds of the politicians and the statesman. Because it may happen that all our work and all you aim at may suffer irretrievable damage because of things going wrong.

I do not know if the development of social sciences and the like is going to help. No doubt, they ought to help. But, I find, if I may say so, just like, it is quite conceivable and I myself know such examples of eminent botanists knowing all about flowers except having an appreciation of them. So, the scientists and social scientists know all about human beings and all their statistics of everything they do and not do and treat them as something, well, something apart from them, which are very interesting subjects for study and are not personally moved by the human aspect of the problem that they have to try to solve it or not. I do not know if scientists are in a position really to help at the present moment in dealing with social sciences and directing them in a particular way.

I have a faint recollection of my early boyhood imagining and I think that was the prevailing temper of—let us say—even upto the early part of 20th century before the First World War came. The temper not in India, I mean, the temper of Western countries of progress or the belief in progress step by step going to higher stages, not only physical betterment, but mental, spiritual betterment and so on and so forth. And as education spreads, people get to know more and more and do the right thing. Well, it is obvious that idea of progress which filled people's minds right through the nineteenth century and the early days of the twentieth does not fill their minds today. There is a great doubt. People do not exactly know what is going to happen, and we find education which is of course the basic thing for progress; we find highly educated people somehow miss something. They are educated but they have missed something that might be called the concept of the good life; the concept of an integrated poised life. And so they are very clever and they can do very many extraordinary things but they just don't know how to live their life in a poised and in an

integrated way and that applies to the individual as to a group and a nation. Now, how are we to get that poise, find that poise and integration in life, in a nation and as between nations? Because, if we do not, we do not remain where we are. We collapse and the choice becomes one of really recovering some balance in international and national relations, some real balance or cracking up completely, because the temper of change is so great. And in that change science, of course, plays a great, has played a great part. Not perhaps because of the actual initiative of scientists that is the application of science, scientists produce a way of doing things and go on and do something else. Now I want to warn you that when I say philosophy, I do not mean metaphysics which is a dangerous subject, and yet which you enter the region of but a measure of philosophy. A measure of a human approach to human problems is not only desirable but essential today for a scientist as for all others. Well, what all others do has some importance in the mass, but what a scientist does has importance individually and in the small group too, because they do count in the modern world and they can make a difference. They can give a turn and a twist to happenings.

I do not know that what I have said has any great relevance to the Science Congress, but I wish to put to you, what I have in mind, quite frankly and the subject comes to me again and again in various shapes and forms. And in the normal course we utter pious platitudes—we politicians, in our public addresses and elsewhere—and we get headlines in the Press. But that is all —it has very little meaning. The real problems remain and are neither solved by a slogan nor by a platitude and those real problems demand if not instant solution at least instant attention in the right way. And, therefore, I have ventured to place some of these ideas before you. (Cheers).

Thank you.

6. Address at the 39th session of the Indian Science Congress held at Calcutta, 2 January 1952*

Your Excellency, Mr. Vice-Chancellor, Mr. President, Mr. Chief Minister and Friends:

It has become the custom of this Science Congress or its Reception Committee to invite me year after year to these annual sessions and for me to come here and, well, utter, if I may say so, some platitudes. Well, I come here realizing that I don't throw any particular light on situation that you might have to consider. Nevertheless, I come here, partly because it satisfies me and I am interested in the development of science in India. I wish to give you, convey to you, well, their sympathy, their message of encouragement and their faith in the future of science in India. And so, I have come here today, as a matter of fact, there are some other reasons also, which are applicable to this particular session of this Science Congress, which is being held in Calcutta. Because, I remember on the last occasion, when I should have attended a session of the Science Congress in Calcutta and when I did not do so, though the failure to do so, was not, well, due to any lapse on my particular part. So, I am particularly gratified to be enabled to come here today at this session in Calcutta, and standing here and hearing the previous speakers, my mind thought of the way—of the part—that this city of Calcutta has played in so many things in India, in the development of so much in India; science you have heard about, the pioneering effort, in so far as India is concerned, took place in Calcutta, but so much else, whether it is music or art or cultural life generally, and more especially our movement for freedom, all seem to have had their inception largely in this city. And so, it is always a great thing for one to come to Calcutta, and to think about this past, and then to think also of the future and how to shape it, and this association of the Science Congress with the city of Calcutta this year, seems to be a particularly fortunate event.

Jawaharlal Nehru addressed the session followed by the Presidential Address by Dr. J.N. Mukherjee on 'Science and Our Problems.'

*Proceedings of the 39th Indian Science Congress, Part I, pp. 29-31; Transcript of the Speech, Nehru Memorial Museum and Library, Teen Murti House, New Delhi.

Well, I have come here to help, if I may say so, to help you, the Science Congress, and the scientists of India, to become popular in India, to give you a popular backing, because I, to some extent, I can give that and I want to give that. I want to give you governmental backing, and I want to give you popular backing and I want the people of India to realize the importance of science in modern life and in India especially and whenever occasion offers itself, I lay stress on that aspect. And as you know perhaps, that one of our achievements in the last 4 or 5 years, one of the principal achievements of our government has been the setting up of a large number of very fine national laboratories all over India. I think, we can take legitimate pride over that and allied developments in India in regard to science. We have thought that in any future progress, it is quite essential that we should lay these foundations. They are not glamorous and many people in India do not perhaps realize what they mean, what they are likely to mean in the future or even in the near present. They like something more obvious. Nevertheless, we were brave enough, if I may say so, in all modesty, to lay stress on certain fundamental aspects of India's progress, to lay those foundations which might not draw much attention but which would nevertheless produce results. Because, results ultimately, are of many kinds, no doubt. But ultimately the other aspect results in producing human beings of a particular type or training or mentality, of producing a mental climate in a country, of producing certain environment, which helps in our general progress or thought. Now, I would not say that mental climate is confined to the scientists and does not extend to others, it does extend to many others in many other departments of life. Nevertheless, scientists—science rather—contributes a great deal to that mental climate which seems to me quite essential for us to progress. Therefore, I feel that we have done a good thing in India, by encouraging and developing or trying to develop science in last few years most especially and by setting up great laboratories and I hope that the governments—both Central and State governments—will be able to continue this good work to the best of their ability. Now, I have come to you, at a peculiar moment in so far as I am concerned, that is to say, immediately after or when I am rather surrounded or engrossed in a particular activity, which is, touring about India and meeting vast numbers of human beings. Some of you, may have had that experience or seen that picture in the course of the last day or two in Calcutta. I have been seeing it for the last month all over India, and it is so overpowering an experience, and it has produced naturally very strong reactions in my mind, which I try to understand. In any event it brings me very close to Indian humanity in the mass, and their problems come up before me in a very acute form—even more intimate and personal way than they come up when we read about them in any books or statistics or elsewhere. And so, for the moment I began to think of

everything in relation to those large masses of Indian humanity and then particularly and how we possibly solve or attempt to solve particular problems they have to face. You know those problems and I shall not say anything about them and you realize their importance. Nevertheless, there is a certain intellectual awareness of a problem and there is a certain emotional awareness of it. We are all aware intellectually speaking of India's problems. But, perhaps, not many of us have that emotional awareness of them and it is this emotional awareness that has often previously come to me, but has come to me in a very intense degree during these last few weeks by wandering about this great country. And another thing that I have felt is that apart from these problems, which may yield possibly to scientific, technical and other treatment, how no problem which affects a large number of human beings, can be effectively solved without their wholehearted cooperation, without their, well, partial understanding of what is being done and what they should do. And then from that, I find, if I may speak with all humility, I know something about the Indian people, for the simple reason that they have allowed me, in all their graciousness to look into their minds and hearts and I have found that the approach through affection, produces tremendous reactions in Indian people. I suppose it produces that in other people too, all over the world, because Indian people are not different from other people, but I can speak only of my own people whom I presume to know a little. And I have found that where the approach is one of affection and cooperation, their reaction is tremendous and they give much more than you expect or you demand from them. Now, because of this, I think of these problems that afflict our country and our people, not only, in that academic, official or scientific or statistician's sense but very much so in that human sense also. How to give them the understanding and the willing cooperation of these people. I think, we can do it. I think, we can do it, but we shall have to proceed carefully and in the right way and scientists also will have to be, or if I may say so, with all humility, not merely scientists, but human beings all the time.

That applies of course to all of us, who function in their set grooves of activity and which applies, if I may say so, most of all to those people who function in those, shall I say, in those mysterious places called the secretariats of India, where forests of corridors run and people go up and down and file the papers. Papers are filed up and all kinds of files go here and there and nobody quite knows what happens. So, it is that approach I commend to you. Naturally as a person intimately concerned with the administration of India, with the well-being of the people of India, a subject which occupies my mind most is how to rid them of their troubles—of their poverty—of their lack of the normal good things of life and so on and so forth. And I want the help of India's scientists to do

that. I mean it is going to that, obvious! In fact, there are one or two other considerations which I should like to place before you.

The other day, I happened to be speaking in Delhi to a conference of statisticians, very eminent people, and I referred there to certain doubts and questionings that I had in my own mind, not about statistics which I honour and respect as from a distance, and because I can not and I do not know much about it, except that it is very good thing and a very important thing, and unless we have that information, we cannot really plan or do much. But, so I gave expression to certain doubts not about my own country, not about any particular thing happening here, but rather about the general trend of things. Now though there was a fair amount of comment and criticism and what I said then and somehow, it became associated in people's mind with the elections that are taking place here, which is very extraordinary, because I did not have those elections at all in my mind. I was thinking of rather larger developments in the world, which I try to understand, because without understanding them it is a little difficult to function. Now, one thing is quite clear that in the world today, a great deal is happening, which is quite, which is, well, not admirable. On the other hand, in this world, the capacity for progress of mankind has become tremendous. Now, one tries to see and understand, if there is anything wrong about this. Why this ceaseless conflict and trouble when any reasonable human being, any scientist surely ought to be able to see that the world has resources enough, capacity enough to solve most of its problems, if not at all, at any rate, the normal problems which we have to face. If we sit down we can solve them, not for one country, or another, but for the entire world. And yet we go . . . and coming to conflict and prepare for large scale destruction and some kind of ambition, some kind or other ambition seizes us and those ambitions coming into conflict. An ordinary question and a difficulty which any sensitive person feels. But, the problems that I posed at that other conference was, how far the very tremendous developments that we have to face, and that we are going in for, are not producing environment in the world, which perhaps comes in the way of human development in some other form, in a more basic form. I do not know, if I make myself clear at all. While we are developing tremendously, in every branch of science, technology and the rest; nevertheless, how is this affecting that very root of all progress, that is the human mind. After all, it is the human mind, that has produced the world, that we see round about us. And if we look at history, we find occasionally very bright patches when the human mind has functioned with extraordinary brilliance. You can find them in our own country in India, you can find them in other ancient countries, sometimes in medieval ages, sometimes in every age you find them, and the question arises, what was

there in that environment or was it something, some racial characteristic that produced that type? Was it just an accident that a period of brilliant efflorescence of the human mind took place and then perhaps declined. Or could that optimum environment be for such a thing they understood and produced? If that is so, if we can understand it, or are the tendencies in the modern world, well, going that way in producing that or are they hindering that production? Or are they doing both, that is producing an environment for the development of the human mind on the one side, on the other side developing forces which inhibited and limited and possibly ultimately crushed it! Well, I am merely posing questions to you and I am not posing them in a spirit of pessimism. Please do not think so, because I am not a pessimist at all. I think it is a tremendous adventure, this phase of life through which we are passing which calls not into our minds, well, in other ways too, to join in this adventure and understand and do something. But, my mind does wander about and tries to think, for instance, this tremendous development on industrial civilization which has brought in some ways, enormous happiness to humanity—a development which is of course due to science and the application of science; we all know, of course, that science and the applications of science have also produced these tremendous weapons of destruction. For the moment I am not thinking of them, although they are worthy of thought, obviously, but rather I am thinking of this industrial civilization becoming more and more mechanical, technological and the rest of it. And thereby I am wondering whether thereby, it will ultimately affect the creative energy of man, the real mind of man in its creative aspects. It may not perhaps, it may take time, it may even take away his inventive genius in a particular way or direction. Limit the ultimate creative genius; how far, that might be affected by too much mechanization and the technical development that we see round about it. I do not know the answer to that, but I think the question is an important one. You know that it is said that in an authoritarian regime, on the one hand, much progress may be made in a country, but perhaps the mind of men gradually gets limited because it has not got that freedom to develop. Now, in the same way leaving out politically or economically authoritarian regime whatever it may be, in a sense in every development of a highly technical civilization begins to affect the mind unconsciously, not by law so much but unconsciously; and you get, you may get the mind, the partly mechanized mind that is thinking in grooves of thought. The mind which is gradually further and further removed from the creative mind and the mind which is adventurous and which looks up to the skies and to the depths of hell and finds out what is it all about. Well, I put this to you. It is not perhaps, a very important question for scientists to consider, well, but it is important, nevertheless for those who consider it important. In other words, science has become, having

attained great triumphs in many fields, has to develop more than it has done. It is doing, of course, but the science of biology and other sciences, the study of man which has not kept pace with study of other things that has led to this hiatus, or gap. Whether we can catch up to that in time or not, I do not know, but anyhow, we have to make an attempt.

I am grateful to you for your inviting me here and I wish all success to your conference. (Cheers).

7. Speech at the 40th session of the Indian Science Congress, held at Lucknow, 2 January 1953*

Mr. President and Friends:

I must apologize for my unpunctuality. But the fault was not mine really. I sat for three hours at the Delhi aerodrome waiting for the fog to lift and the fog was reminiscent of, well, the worst type of London fog. (Laughter).

I have come here today not to speak on scientific subjects, but rather to listen and to learn something; and more especially, to offer all of you welcome on behalf of the Government of India – those scientists, eminent scientists, who have come from abroad and those who have come from various parts of the country. I hope many of you have realised that the Government attaches a great deal of importance to science, to the uses of science, and, therefore, also to those, who are the high-priests of science today.

During the past few years the Government had tried within its capacity, to help the development of science in various ways by having a number of National Laboratories, Institutes and others built up and many of you who are present today are, no doubt, working in these very fine institutions. For my part, I think that one of the most satisfactory features, among the other features—good or bad—of the last four of five years has been the building up of these great laboratories and the opportunities thus afforded for the development of science in this country.

Now, it is curious, that in a sense, all of us, and practically every country, worship in some way or other at the shrine of science and yet doing so we seem to keep science and what science stands for in a particular corner of our minds, and do not allow it to interfere with the rest of our activities. Hence some kind of dual approach to problems is made by

Jawaharlal Nehru's speech followed the Presidential Address by Dr. D.M. Bose on 'The Living and the Non-Living'.

*Proceedings of the 40th Indian Science Congress, Part I, pp. 36-41; Transcript of the Speech, Nehru Memorial Museum and Library, Teen Murti House, New Delhi.

most of us, probably by politicians most of all. Politicians will come and perform various ceremonies in connection with scientific institutes and say something about the great virtues of science. But in some other activity they are not likely to indicate too much; either the temper of science or the training of science. But really, I mentioned politicians because I am one, and I think I should begin by dealing with my own tribe, but it applies to others too; and oddly enough, it sometimes applies even to scientists—(Laughter)—who in their laboratories are very good and they specialise in their particular subject. But outside their lecture halls and laboratories they appear to become, well, something entirely different from what a scientist is supposed to be. And yet any person will realize, first of all, the quite astounding changes that have taken place in the world because of the development of science and its technique. There, the last 100 or 150 years have changed the face of the world enormously. They have affected every kind of human institution, human life, human thinking. And yet perhaps, oddly enough, again they have not affected human thinking quite so much as they have affected human life, although they have affected it inevitably. We take many things for granted, many things produced by science. We are surrounded by them, we cannot help it. We cannot escape them and we cannot take them for granted. But they have not produced often enough an adequate impact on our minds, and I am not talking about individuals. I am talking about the generality of the people. And our minds continue to function in what might be called the pre-scientific age and sometimes even an earlier age and so we have this very peculiar combination of something which is obviously the product of the human mind, i.e., science and all that has happened. It has come out of the human mind and yet the human mind itself is lagging behind its own product. And this disparity, possibly is one of the reasons why, we get tied up into knots and why, while on the one hand we talk rather glibly of one world, which is perfectly true because scientifically and by the development of communications and the like we have become a very tight one world. And yet any person can see that we are as far removed from the one world in spite of all this coming together as any thing can possibly be. In fact parts of the world resent even the existence of the other parts. Parts of the world want to destroy other parts of the world. Well, surely, that is not the kind of prelude to a one world. So, we get this extraordinary contradiction. While reason, logic and all modern trends in life point to the closest cooperation all over the world; human wishes, passions, prejudices or whatever they may be try to go as far away from this idea of one world cooperation and continually think rather in terms of elimination of one or the other or destruction of one or the other. At any rate, they do not at all appreciate or understand that it is possible for any such cooperation to take place in the world, as

it is today. Whether scientists or politicians or others can solve this riddle or not I do not know. But obviously, the future of the world depends upon that, depends upon it more especially because the alternative now is rather terrible to contemplate. And so how are we to approach this problem? If the scientists go on functioning in an ivory tower way, they will do no doubt some good. If they come out of the ivory tower and help in solving the problems of the age, they will do a great deal of good, as they have done indeed. But, somehow, even the solution of limited problems does not nccessarily take us much further in the solution of the major problems of the age and the avoidance of this tremendous conflict which seems to envelop us all the time and which results in lowering the scientific temper of the age. The individual scientist may be exceedingly good at his particular kind of work. But, as I said just now, even that individual scientist becomes a prey to prejudice in other spheres. Now what happens in these other spheres we can see all around us, that on account of this distrust and fear, anger at each other, the critical faculty ceases to function in groups, in nations and to some extent in individuals. Now if the critical faculty does not function that means the scientific faculty does not function because science must be critical. It cannot accept or reject things wholesale without analysis, without criticism and without examination. So, we see the complete or the large scale abeyance of the critical faculty today in the world. Outside the limited spheres, that is when we consider world problems, when we consider the kind of problems, let us say, that an unhappy foreign minister has to consider, one finds very little of the critical faculty left, only complete rejection of something, denunciation of something, or complete acceptance of something with fulsome praise of it. And everybody thinks in terms of just black and white, one person is black and the other person is white and there are no shades of grey left. And apart from this, we have a feeling, which again appears to me rather odd, that others should be likened unto ourselves, that is to say, each group imagining that others should necessarily be like them in ways of thought, ways of living, ways of action and ways of everything. And when two or more groups think like that and if I may bring in the religious parallel to the domain of politics, and proselytize too much, they come into conflict. I should have thought that one of the obvious lessons of this world was that the world is very various, outwardly so. Obviously, climate differs. Climate has a powerful effect on human beings and environment has a powerful effect. It is no good, even in India, asking a person coming from south of India to go about in a fur coat, which is very necessary in the Himalayas. All this is India. Of course, this crude example can be followed by better examples, but it is good enough. Nevertheless, people seem to think that others must shape themeselves,

model themselves according to a certain scheduled pattern, which means like themselves. Now this is very odd and this business of each individual thinking that he possibly or his group is the model of behaviour, model of living and model of thinking, which others must follow. I suppose, each one of us is rather egocentric, nations of course are so. But it does make a difference, each one of us as we are the centre of a circle, as we probably are. In that way it does make a difference, where the circumference of that circle is. If it is a very small circle with a narrow circumference, well, we become narrow. If it is a broad one, the broader it is, possibly the broader the outlook that we might possess. Now it is not for me to criticise others and especially in this great and varied diverse world. But even in my own country I can see all these different traits at work, these urges. India is a country which has shown in some ways a remarkable unity even when split up in various ways. There is an essential unity about it and India is also a country with a very remarkable diversity, and the problem in India is to maintain both, not to crush the diversity and obviously not to lessen the unity—in fact to increase it. We find forces at work and individuals who want to regiment it to the extent of putting an end to all that richness of life in India and each person wanting to make the other function as he does himself, even in small matters of clothing. Now, as I mentioned, it is quite easy for me in Lucknow to wear a certain type of footwear which will be completely inappropriate in Ladakh. In fact, I will not survive—my feet will not survive at all if I wear chappals in Ladakh: I have to wear thick boots with woollen lining there in order to survive apart from other clothing. The same applies to so many other things. This proselytizing spirit of imposing yourself on others, whether it is a question of language or whether it is any other question, is there. Personally, I rather like the crusader. There is something attractive about him, something good and it is the crusader who has made a difference to this world. He is a person with a certain, missionary spirit for a cause, forgetting himself in that cause. But, of course, the crusading spirit sometimes can be exercised for wrong ends and bring about wrong results. I am just hinting at these various things because the only way really to consider them is what might be called the even temper of science which does not allow us to run away with particular individual fads and fancies, which helps us to get out of those narrow circles in which as an individual or as a small group we may live, whether that is a geographical limiting factor or whether it is a small part of a country or the whole country or in any other way of thinking or living. And to recognize that people are various and they should be various, and why should not they be different? That contributes to the richness of human life and experience, not to try to impose ourselves on others in the political or the economic field. Of course, we talk of words like imperialism and the like which means a political

imposition and an economic imposition, economic exploitation and all that. Those are generally understood, and most people in the world feel that we must not have that, we must put an end to this kind of imperialism, which dominated, let us say, the 19th century. It is largely disappearing and will no doubt disappear. Nevertheless, it is disappearing not only because, well, it was not a good thing in the balance, but because it really cannot exist now because of the new forces that have arisen. But there are other ways also. Apart from that old type of imperialism, there are other ways of interfering with others. Well, in any human society there is bound to be some interference, some regulation, some discipline. But I take it that the democratic way of looking at things is to keep that interference to the minimum. There is of course always the problem of modern life, demanding more and more centralization. That is essential and yet centralization to some extent always comes in the way of democracy in a sense, or individual freedom and one has to balance the two. I am putting these matters before you because these problems trouble us nowadays, trouble my mind, how to balance these respective things which are good, but which carried to an extreme, are not good – like nationalism. All of us in this country has been bred on nationalism. It has been to us a liberating force – a good force – and yet, obviously, that very nationalism carried to an extreme, becomes a narrow thing, a limiting thing, a restrictive thing and a bad thing. So that a thing which is good, may not be good in different circumstances or in a different degree, and we see aggressive nationalism still functioning. We see even the idea of doing good to others becoming so aggressive that it becomes a nuisance whether nationally or internationally. The idea of making others conform to a certain pattern of your liking—and your liking may be a good liking—nevertheless the compulsion of making others conform too much may have bad results and it does usually have bad results. At the same time there has to be some conformity. One cannot go to pieces, each individual doing what he likes in organized society. So all these things conflict with each other and one has to find some balancing factor—how to preserve as much individual freedom, how to preserve the richness of diversity in unity and so on and so forth.

Now where does science come into this picture? Of course, science comes in or should come in because the time that the science can merely produce things or improve the material lot of man is not quite good enough. It is good of course. It has to do it, but more specially in a country like India, which is economically backward where standards are very low, our very first priority is to raise those standards. It is no good talking about things of spiritual and cultural advancement to hungry people. We have to give them the primary necessities of life, whether it is food or clothing

or housing, or some other things. And only then can we think of the rest. Nevertheless, even though we might lack the primary necessities and we try to fulfil that lack, the other problems face us all the time, press upon us and tend to upset us as they upset other countries too. A scientist, therefore, has to tackle the other problems also, help in tackling them and the best help the scientist can give is to try to produce that critical faculty in considering problems, that evenness of temper, that objective way of looking at things which if enough of us cultivated would undoubtedly help tremendously in lessening tensions, national and international, and in going some way towards the solution of those problems.

So, we invite you, scientists, to help us in solving our material problems which are highly important, whether they are of food or other necessaries of life, so that we may raise the standards, because without that nothing can be done and we have to face continual danger, grave danger, in many ways. But, we invite you also, to help in dealing with the larger problems, social, economic, psychological and all that; and finally, to bring about, as I said that temper of science, which unless we develop, the weapons and all the good that science has done, can be used for evil ends and we ourselves get swept away by passions of the moment and to use the great weapons that science has given us for wrong ends. And that would be the tragedy of science and the scientist, as it is to some extent even today. So, I welcome you all on behalf of our Government and assure you, that to the best of our ability, we shall encourage the development of science in this country and ask the scientists here to associate themselves ever more in the solution of our problems. It may be that the scientists might not get the same financial inducements as others do; somehow financial return has seldom been tagged on to learning in any country. Perhaps, it is as well, though it is not well if this means a pressure of circumstances on the worker in science or elsewhere. In India, in the old days when some kind of theoretical or practical division of society was aimed at, the man of learning was put at the top, but he was not supposed to have either financial power or indeed much resources or political power except rarely. This power of learning was supposed to keep him at the top. The modern division of society as practised, does not give quite that theoretical place to the man of learning and other people usually get at the top in that sense of the word. But the fact remains, and I am talking about India for the present, that the scientist must inevitably occupy a more and more important place in our society. In the very old days probably the priest occupied it. Well you may consider as I said previously, the real scientist is the priest of today in that sense. To some extent of course they talk also in intricate priestly language which most people do not understand. Then in India in the last hundred years or more the

administrator became the top person, ordering about everybody else, and even now the administrator on the whole considers himself and occupies a very important place—probably the top place. An administrator is important, of course, but I do not think he is quite so important as he thinks he is (Laughter), just as the politician is not quite so important as he thinks he is. Of course, when I use the word administrator I use it rather in the sense of the professional administrator. The politician of course hovers about. He is sometimes an administrator sometimes not. People seem to think still that scientists, experts, engineers and the like they are there to be consulted as experts, and then pushed aside and then the wise administrator comes to a decision. Yes, in coming to a decision one has to see every aspect of a question, and if, as often happens, that expert sees only one aspect very intensely, he may not be able to judge aright about the other aspects. That is true, but still this business of thinking that a person who sits at the head of an administrative office is more important in the scheme of things because he does not know much about any particular thing than the person who knows much about anything is, I think, wrong. And we must gradually adapt ourselves to thinking that the administrator also has his place, he should not be all over the place. So we should fashion a society where the real scientist will play a more important part, in developing, in helping that society to function and in promoting that scientific temper or even temper which has become quite essential not only for progress but even if we have to survive. So, I welcome you again. Thank you. (Cheers).

8. Inaugural Address at the 41st session of the Indian Science Congress, held at Hyderabad, 2 January 1954*

Mr. President, His Exalted Highness, Chancellor, Vice-Chancellor and Friends:

It has been my privilege to attend almost every session of the Science Congress during the last 7 or 8 years. Once, I even had the high honour of being the President of it. On other occasions, I have delivered, what are called, inaugural addresses and so I have been invited and summoned today to take precedence even over the President and deliver some kind of an inaugural address. My mind goes back—during these seven years, and I think it may well be said that whatever our other failings might have been in this country, we have done a fairly creditable job in regard to scientific work. I do not mean to say that we have performed any wonders or made any discoveries and all that, but what is important is that we have laid solid foundations for scientific work and out of those solid foundations, opportunities come and out of the opportunities and the work done results flow. Therefore, we are entitled to take some satisfaction at the progress of scientific work or rather the foundations for scientific work, the laboratories, National Laboratories, etc., institutes, that have started functioning, during these 6 or 7 years. I wonder—I speak without knowing—I wonder if during these last years and during a like period this type of progress has been made in regard to science in any other country. Having said that, I wish to make it perfectly clear that I do not consider that - something, well, is enough—that is a foundation and the foundation though good requires something else before it becomes habitable and therefore, I think we have to pursue this path vigorously, effectively and enthusiastically for a variety of reasons—both practical and others. The Vice-Chancellor has quoted somewhere what I am supposed to have said – I forget when and where I said and even if I said it, but I will take his word for it that I did say it. (Laughter). Anyhow, there is much truth

Jawaharlal Nehru inaugurated the session followed by the Presidential Address of Dr. S.L. Hora entitled 'Give Scientists a Chance.'

*Proceedings of the 41st Indian Science Congress, Part I, pp. 31-34; Transcript of the Address, Nehru Memorial Museum and Library, Teen Murti House, New Delhi.

in that. That is to say, without our developing science—not only science in its practical and theoretical aspects but also the temper of science—we are likely not only not to go ahead but perhaps to slip back. Therefore, obviously, the importance of science is very great. It requires to be dinned into many of our people who have been brought up in an earlier and different tradition which did not think much of science or took science for granted, as the work of some odd people messing about in laboratories not realizing that the modern world is a child of science, and everything almost that is happening today, is somehow or other connected with science or its development.

Whether we touch our grave problems—economic problems, problems of poverty, of raising the standards of living, of unemployment—whatever problem we have to think about – we have to call in science to our aid. All that, I suppose is well-known; and well accepted. But, there is another aspect of science, which is forcing itself on our attention more and more—a powerful aspect – a rather terrifying aspect. Now, science all along has been concerned, if I may say so, with the why of things. Why is this so? It has tried to understand the nature of this phenomenal universe of ours and in trying to understand it, it has uncovered many of nature's laws, taken advantage of that knowledge and used it for human benefit usually; sometimes, not so much for humanity's benefit. Anyhow, science has been concerned with the why—why is it so? What is that so? A true scientist was not so much concerned with where his enquiry will lead him to. He was just trying to discover truth in some shape or form. It may lead him to heaven and might equally lead him to hell. That was not his business. He was merely trying to find out, how the forces of nature and other things were working. Having found it out, naturally it became his job or somebody else's job to utilise it to human advantage. That was natural and I am not quite sure that I would like a scientist to get out of that way of looking at things or of searching for truth. I am not sure that I would like the scientist to develop the politician's mind or approach to things. Now a politician's mind—I am not talking in any terms of criticism of the politician or the scientist, but they are different approaches. And I am not talking naturally of the immature or indifferent scientists or the immature or indifferent politicians. I am talking about more or less competent politician and the more or less competent scientist. A politician seeks not so much the why of things as a scientist but he wants to get somewhere. He wants to achieve certain results in the political field, in the economic field, in other fields. If a scientist's approach and a politician's approach were joined all together, then we get something—well, in a sense an integrated approach to the various problems which we have to face. As I said, the scientist thinks of the why. He does not think of

where that why is leading to. So he goes on uncovering and discovering many things, many forces and then sometimes finding to his horror that those forces may be used for evil purposes. Also, sometimes, finding to his horror he himself becomes a prisoner to his own discoveries and the forces that he has let loose; and so, we have today, in the ultimate sense, a challenge to science and to the scientist. Because we have arrived at a stage when merely the why is not quite enough and it might very well happen that the result of those researches in science might produce ultimately a grave disaster to the world. People say scientists are responsible. Well, in a sense they are, because it was they who uncovered and released those forces and brought them in the ken of human knowledge. At the same time, it is rather silly to blame scientists for it. We are all responsible in various ways. But, it is true that scientists have to give thought to this matter and to realize that the work they do and which they no doubt do in all good conscience for good purposes, may lead to terrifying results and that is the challenge of the day to science and the scientists. Are they both in their wisdom and their folly, to become the tools of others and to be exploited for evil ends, the knowledge that they gained, will that knowledge be used for bettering humanity and removing its many ills? As the Prime Minister of England said the other day, 'we have a strange choice today'. 'One is'—I forget his words, but something to this effect—he said, 'one is undreamt of advance for humanity and the other is irretrievable disaster.' Well, surely, if you put that choice before anybody, nobody is going to choose the latter. There is no difficulty about choosing. And yet, although there is no difficulty about making that choice, yet that choice in action is not made. How far it is made even in mind is rather doubtful, because the mind is oppressed by fears and apprehensions and hatred and all their wretched brood. The result is that while we have something for which humanity has pined hard and worked and laboured for ages almost within its grasp, we cannot reach it. And there is a possibility of instead of reaching it—our having to face terrible catastrophe and disaster for the whole race of man. Now that is the problem and all other—in effect all other problems which you may discuss in this conference or which we may discuss in political or economic or other conferences really sink into insignificance before this terrible choice of the age. None of you have the power to control the world's destiny just as the politicians have not either. They may be leading persons in states or having the governance of large numbers of human beings in their hands and you may read about them in the newspapers which give big headlines to the notorious politicians of the day. But the fact of the matter is that, however big they may appear in headlines or in their offices, the forces that work in the world are infinitely greater than they and before them sometimes they almost appear as puppets unable to control not even

themselves, leave out the forces. Nevertheless, that is perhaps an exaggerated view that I put forward; even those politicians, and even those scientists can do a good deal. They are not quite helpless. And, therefore, the problem arises what should they do about it? How to make sure that the right choice is made between that tremendous good and that tremendous evil? It is not a question of our passing a resolution that would be easy enough. It is a question of our going deeper down into things and from the whys of science thinking of the world too, where do we go to, what do we aim at? Of course, even in the last some years, a generation or whatever you might like to call it, science which began with abstruse laws and formulae, in the realm of mathematics, physics and the rest, and had advanced in that realm tremendously, till you peep into the ages of this universe with the help of those extraordinary formulae, which wise people understand, I do not. Now science has moved on to other realms—to biology, to psychology, to trying to study the mind of man, his actions and so on and thereby rather crossing over from that strict—how shall I call it, strict definition of science as it used to be, to other realms which are vaguer, and thereby also crossing over from the pure why to something else. Anyhow, whether in the practical world, or in the theoretical sphere, science comes up against this challenge, all of us do, if we think about it. We may, of course, ignore it, we may be lost in our little problems and imagine that they are very big. But, none of us really dare ignore this major problem. Our friends who spoke before me talked about Hyderabad. How it has been a kind of place where various syntheses have grown up, various linguistic areas, various religions and the like. That is perfectly true. But, that, of course, can be said of the whole of India. Now, I am not going to praise India, and to make out that it is unique among nations. Each country is unique of its kind. And the people of each country tend to praise their own country and think it is the chosen country. But it is not a question of praising India or any other country, but trying to understand that. And it seems to me that India has, has had that past tradition of synthesis. It is, it had strong roots of its own, and it could not be easily be blown over or swept away by currents of air; but currents came to it, rivers of humanity flowed into it and got mixed up with the ocean of India, making a change there, no doubt, and affecting it and being affected by it. And through this course of ages, all this thing what is India today grew up. And so after this millenia of history, we are a peculiar mixture, carrying the burden of the wisdom, the folly and the madness of 10,000 years and it is all mixed up and sometimes the wisdom comes up, often the folly, and sometimes the madness. What are we to make of all this? How does science help us to bring a modern synthesis of these problems—something in keeping with the genius of India? Because it has been the genius of India to work for

synthesis, in spite of all those who have tried in the past to break it up in spite of all those small-minded persons without vision, who today think parochially in narrow terms, forgetting the larger issues before this country or the world.

Here even in Hyderabad, you have plenty of these narrow-minded persons who cannot think except on those narrow-minded terms, forgetting that it does not matter the slightest bit that their petty problems are decided this way or that way. But it does matter a great deal to India, and to Hyderabad and to the world how the big problems are going to be decided. And it is time that people realized that this petty-mindedness and small-mindedness should not be encouraged—should not be tolerated. Where are we looking to? Which way are we going? That is always the question. And even though I might be a politician, overwhelmed with the problems of the day, I cannot help, as no sensitive person can help, looking a little beyond today, a little beyond tomorrow even. For then, my own country's history pursues me, its long story of joy and sorrow and agony, and I want to look ahead. And I do not want, as far as lies in us, to make the mistakes that we made yesterday or the day before. We want to profit both by the wisdom of the past and the follies of the past, so as we might avoid those follies. But well, again I come back, how does science help us? The scientist quite rightly will work in his particular field. He will burrow a way and seek his, through trials and errors, new truths, uncover them, many a time he will fail but even in failing, he will learn and teach. That is right but then somebody has to bring about a synthesis of this wider knowledge in the scientific field and apply it to the practical field, to the political field and the other fields of human endeavour. That is badly needed in this world today, lest we take a wrong path and go astray completely. It is an odd thing that while we grow wise, we grow more and more learned—by science and by other ways of study, I wonder often whether we do not at the same time grow less and less wise, because wisdom and learning are not synonymous. They may occur together; they may help each other; but they are not the same. We find today men of very high ability in their particular spheres of life, whatever they might be, and yet men of little wisdom—men with very little consciousness of human values. And so one begins to doubt if something is not terribly lacking in this accumulation of learning without wisdom. Something we are getting now, a civilization more and more governed by intricate machines. I am a great admirer of the machine; I like it; but as I look at these great machines functioning, and as I see their influence on the human mind, that human mind becoming more and more machine-like and less and less wise, I wonder if the time has not come to balance this somehow—not of course by discarding the machine; that is neither proper nor possible, but by

laying stress on something else. We see highly developed people who are far more advanced and developed than we are, sometimes behaving in a manner which seems to us quite extraordinary. That is, the way they indulge in violence and hatred and preparations for great violence, without realising the effect of it, what the effect of it might be. So, all these problems come to my mind, as they must come to the minds of many of you. None of us by himself can provide a key or a solution to them. But, possibly if we are alive enough to them and if we give our thoughts to them in our respective spheres, it is quite possible that we may do something which might be worthwhile in this crisis of our times.

Jai Hind!

9. Inaugural Address at the 42nd session of the Indian Seienee Congress held at Baroda, 4 January 1955*

Inaugurating the 42nd session of the Indian Science Congress, Shri Jawaharlal Nehru, Prime Minister of India, paid a glowing tribute to the memory of the late Dr. S.S. Bhatnagar. He observed: 'I have always associated with many prominent figures closely connected with the Science Congress and among them the chief was Dr. S.S. Bhatnagar. It is not necessary to say anything formal about him. You all knew him. But, I would like to pay a tribute to Dr. Bhatnagar, with whom I had cooperated for the last six, seven years or more and, who, I think, has done, I say this with all respect due to others, more than anyone else for the scientific development in India. We have eminent scientists in this country and people eminent in other ways; Dr. Bhatnagar was a special combination of many things added to which was a tremendous energy, with an enthusiasm to achieve things. The result was, he has left a record of achievement which is truly remarkable. I can truly say that but for Dr. Bhatnagar, you could not have seen today the chain of National Laboratories in India.'

'It is sad that he should have passed away suddenly in this way. There are many things which he discussed with me and which we hoped to put through soon. We want many more scientists if we are to go ahead and solve our problems.'

Coming to the subject of his Address, Shri Nehru appealed to scientists, engineers and technicians all over the country to take an intimate interest in formulating the National Plan for improvement of the conditions of people. Unless they did that, they would not be doing their function completely nor would the country be utilizing their services as well as it should, he remarked.

Continuing he added: 'In the work of the formulation of plans and in the

Dr. S.S. Bhatnagar F.R.S. had passed away on the eve of the Science Congress session and Jawaharlal Nehru, in his Inaugural Address made a touching reference to his services to science and its development. The Presidential Address, entitled 'Science and Progress' was delivered by Prof. S.K. Mitra.

*Proceedings of the 42nd Indian Science Congress, Part I, pp. 33-35.

matter of implementing them the cooperation of scientists and technical people in the country is more important than the cooperation of anyone else. Some eminent foreign people have told me that while Indian scientists are doing excellent work and the National Laboratories have a great and fine staff there is an element of 'ivory tower' attitude among scientists. I do not think the criticism is correct. Still it is a fact that scientific research work and its practical application have not been properly coordinated with the big plans of development.'

'As it is the duty of the Government and the Planning Commission to pay attention to this problem, so also it is the duty of the scientists to cooperate with the authorities in every possible way. Only in that way can spring the necessary coordination between scientists, Government and the Planning Commission.'

'Planning in India is a tremendous task. We are planning in a big way. The plan has to do with the improvement in the standard of living of 360 million people and removal of the unemployment. The Planning Commission is endeavouring its utmost to do it. But our scientists and technicians wherever they may be should take an intimate interest in the planning work. Unless they do that they are not doing their function completely nor are we utilising them as well as we should.'

Appealing to the administrative officials to shed the old attitude of looking upon scientists and engineers as merely experts who could be summoned to advise, and thinking of themselves as the repository of every kind of wisdom and capable of taking up any job and doing it, Shri Nehru said: 'I know the administrative services have changed greatly and are doing good work, and it is the general conception of what your objective is and where you are going, that must change.'

'In the days of the British Government, the administrative officials were merely to carry on and remain where they were. It was a static conception. Obviously, at present we cannot merely carry on. We have to move fast and in fact we have toned up to a great extent. For this reason our conception should change and we should recognize that engineers and scientists are far more important than the administrators in so far as the progress of the nation is concerned.'

Shri Nehru advised the scientists that in their endeavour to create an atmosphere of free enquiry which was so necessary for scientific development and to ensure that their activities and researches led to the

good of the country and mankind generally, they should not just bow down to governmental or nationalistic pressures. Simultaneously, he reminded the scientists that his own definition of good and evil was likely to be limited and might not fully signify what was meant.

He stated: 'We must have some form of co-existence. With the development of nuclear weapons and the rest, it is clear that the only alternative to co-existence is co-destruction.'

'I mention these things to you because they concern more and more the scientists. Sometimes, scientists have to shoulder terrific responsibilities, because it is due to their labour that some big development, either for the good or evil of the world, may take place. But it is not a problem at present in India. We are not playing with atomic bombs at present. But it is the life problem of the world. I do not offer any solution of the problem. Each person will have to think it out. You have somehow to bring about an atmosphere of free enquiry which is so necessary for scientific development. Today scientific development is getting less and less free under nationalistic and governmental pressures.'

'So, we have to face this problem. I hope that your service and your working shall be free from any such pressures from the Government or from any other source.'

Prime Minister Nehru described the present age as 'the age of advertisement' and appealed to scientists and all educationists to avoid advertising their own worth.

They should not shout their virtues and demand recognition. He did not know if this was a pertinent suggestion in a world which today was so used to shouting about itself and 'mount on somebody's shoulders and dance in the world.'

Towards the close of the speech, Shri Nehru remarked: 'The older I become the more humble I am becoming in my approach to truth. My mind is always struggling and having its own inner battles while I ponder over things. One should not imagine that the truth he seeks is the whole truth. I myself, am not bound by any dogmas and am always prepared to admit my mistakes and rectify them. I believe that such an approach is nearer to what may be called the scientific approach and in that sense I

consider myself as having a scientific temperament, although I cannot claim to be a scientist.'

Shri Nehru said he saw in this world today that many of the great qualities he believed in were vanishing: 'People are getting rougher, coarser, more belligerant to each other. But, I hope India will progress and yet preserve those qualities she has always valued.'

10. Inaugural Address at the 43rd session of the Indian Science Congress held at Agra, 2 January 1956*

Inaugurating the 43rd session of the Indian Science Congress, Shri Jawaharlal Nehru, Prime Minister of India, extended a hearty welcome to the eminent scientists from abroad who were present on the occasion. Shri Nehru said: 'We welcome the foreign scientists not in a selfish way, but their presence here enables us to benefit by each other's experiences. Just as all other kinds of cooperation are to be welcomed, it is also good to develop scientific cooperation between different countries.'

He then exhorted the scientists not to live in ivory towers or to become passive spectators of life in the name of objectivity of scientific study but to keep in mind the consequences likely to follow from their actions.
He added: 'Scientists should conduct scientific research in relation to the problems of the day. They should consider the basic approach to the problem which, in my opinion, is temper for peace.'

'The results of the atom and the hydrogen bombs, if unleashed, would be disastrous. But much more dangerous than this is the kind of atom bomb we nurse in our minds. It is, therefore, of great importance to deal with the atom bomb in our minds and hearts.'

Shri Nehru then quoted Mahatma Gandhi as saying, 'If you have sword in your heart, then be out with it and use rather than nurse it in your heart and bosom. It spoils you and others and spreads hatred and ill-will if you go on nursing it in your mind and bosom.'

Continuing Shri Jawaharlal Nehru stated: 'There is today a conflict arising in the minds of some great scientists as to how far they are justified in using their ability towards ends which might produce evil and bring

Jawaharlal Nehru inaugurated the session followed by Presidential Address by Dr. M.S. Krishnan on 'Mineral Resources and their Problems.'
*Proceedings of the 43rd Indian Science Congress, Part I, pp. 28-30.

about destruction and devastation. It is no doubt a legitimate conflict. After all, a good scientist is essentially a sensitive human being.'

'Scientists must not view things from a purely scientific point of view; they must have an integrated picture of life before them. The Five-Year Plan of India would only be a good plan if it looks at India's life as a whole. In the same way, the scientists have to look at life as a whole, always thinking of the consequences of their actions and doings.'

'I strongly feel that at the present stage, people's minds are receptive to things which may lead to peace and lessen tension. Action on one's part, however good it may be, largely depends on the receptiveness of the people's minds. I have no doubt, unless a thing happens at the right time when the people's minds are receptive it leads us nowhere. Of course, we must try to produce the receptiveness, but for a truth to be appreciated, the time must be right for it. As people's minds are receptive today, it is all the more important that scientists and politicians and others engaged in public affairs should take advantage of that receptiveness of the people's minds.'

Speaking about the desire for peace Shri Nehru said that there was increasing desire for the avoidance of war which might be terrible if unleashed. After all, it were the scientists who had placed at the disposal of man vast vistas of tremendous power which could be used for good or evil purposes. It was, therefore, for the scientists to take a lead in this matter and help people to think rightly and move in right directions. They should show to the world that their work was not only to manufacture bombs and make experimentation in explosions but something much bigger, namely, the welfare of the human race.

The question before them today, Shri Nehru said, was how to counter the hostile approaches to each other and how to deal with the intangible which came in the way of finding good in others. The scientists, after tremendous victories over the physical world, should now dabble in the inner urges of men and nations. Perhaps, that might help a lot.

He observed: 'I believe firmly that every action has a certain consequence. Every good action has definitely a good consequence, and every evil action an evil consequence. A good action always leads to good reactions. If you nurse hatred and violence for the other party, there is no end to them. On the other hand, if you feel goodwill and friendship for the other side, this will help in building up a vast fund of goodwill.'

'I have no doubt in my mind that evil cannot put an end to evil, nor violence can end violence. You will surely forgive me for digressing from the problems that you face during these seven days, but I do believe that these are the basic things in life which we ought to keep in mind.'

Science, Shri Nehru said, today overshadowed the whole world not only in external activities but in man's thinking. Scientists today occupied the high position that learned men and priests who lived in the past and probed the mysteries of nature, occupied. Today, science did not function in a mysterious way. Science was largely an open secret. Nevertheless, it became so complicated that few people had the capacity to understand it. And for most of them it had become mysterious and beyond their reach. He added: 'Something very essential has grown out of science. What we do in our daily life is closely connected with science and its application. Science today dominates us and is likely to dominate us in future.'

Shri Nehru emphasised that scientists must function in life with an aim at something. They should have some broad ideal before them which would obviously have some relation to the problems of the day. For instance, the problems that the Indian scientists had to deal with were related to the development of better standards of living, removal of economic inequalities and so on and so forth. That was a very big problem, but scientists had essentially to help in that process.

He said: 'This is why the men and women of science should consider the basic approach to all the problems. By a basic approach to problems I mean the basic temper of science, the temper of reasonableness, the temper of peace. These approaches were very important to end and solve the problems facing them.'

Shri Nehru stated: 'Means were more important than the ends. It were the means which counted.'

'You may not achieve the ends you have in view if your means are not right. To settle a problem, it makes all the difference if the parties are aggressively hostile to each other. Nothing can be achieved by exhibiting aggressive hostility. It is only evil that results. But, when the approach is friendly, always something good comes out. When we come to a stage when a false step may lead to disaster, it is very important for us not to take that step and not to associate ourselves with that frame of mind which is likely to lead to that step.'

Appealing to scientists not to live in ivory towers and not to isolate themselves from their surroundings Shri Nehru said: 'You must look at life as a whole, always keeping in mind what you are doing and what the results of your actions are. The time has come when it is difficult for anyone to live in an ivory tower and isolate himself from his surroundings. We have to get out of narrow shells and compartments and take an integrated view of life.'

'Scientists who have an important part to play in moulding the destinies of the people must not lose sight of this fact.'

11. Inaugural Address at the 44th session of the Indian Science Congress held at Calcutta, 14 January 1957*

Mr. President, Chancellor, Vice-Chancellor, distinguished delegates of the Science Congress and Friends:

It has almost become a custom for the Science Congress to do me the honour of inviting me year after year to inaugurate its sessions. I believe I have been doing it for ten years or so. I consider this a great privilege and honour for a variety of reasons although I sometimes fear that repetition of a practice makes it rather stale.

I come here every year in a dual capacity, if I may say so, as the Head of the Government to convey the greetings of the Government to the delegates both who come from abroad, and those from our own country to tell them of the Government's keen desire to help and encourage the pursuit of science and the application of science; and I come also in my personal capacity because I am deeply interested in the work that has been done in India and abroad in the various fields of scientific activity.

These fields become wider and wider, and often impinge and are impinging today on realms which might almost be considered unknown and which threaten the future of human race. Every sensitive person, therefore, must necessarily be interested in what science and scientists do.

I am coming here today from Hirakud where yesterday I performed or helped in the opening ceremony of a very magnificent piece of work of Indian engineers, the great Hirakud Dam, which, I am told, is the longest in the world. A day before, that is day before yesterday, I performed or participated in a completely different function at Nalanda, the great

The Inaugural Address by Jawaharlal Nehru was followed by the Presidential Address delivered by Dr. B.C. Roy, entitled "On Science for Human Welfare and Development of the Country."

*Proceedings of the 44th Indian Science Congress, Part I, pp. 29-32; Transcript of the speech. Nehru Memorial Museum and Library, Teen Murti House, New Delhi.

university centre of 1500 years ago in Magadha which is now Bihar. And at this great university centre where the ruins of this university still exist my mind went back to the old days when Lord Buddha flourished there and went to Nalanda or Rajgir and when his message had powerfully affected the Indian people. And so, I wandered at the close association of this ceremony at Nalanda, and the memories of Buddha coming to me and of subsequent events of that university; and the next day at a product of modern science, the Hirakud Dam, and today I am here before you at this Science Congress.

And the centuries seem to come together before me and again I thought how India is a bundle of centuries wherein I find almost every century represented here from the remote past to the modern age; and somehow, we jog along with the past and the present, and even have been working for the future together, and the cow and the tractor march together in this country, or more or less together. I do not know the future. It does not seem terribly incongruous that the cow and the tractor are side by side.

So, my mind wandered again, but then coming back to Nalanda I thought of the message of Buddha which was, apart from its religious significance, a message of tolerance, a message against superstition and ritual and against dogma. It was a message essentially in the scientific spirit. He asked no man to believe anything except what he could prove by experiment and trial. All he asked man was to seek the truth and not to accept anything by the word of another even though he might be Buddha. That seems to me the essence of Buddha's message and, of course, tolerance and compassion, and it struck me that the message far from being out of date had a peculiar significance in this world of ours, even today.

Then my mind wandered and I found greater rigidity coming into people's thinking in whatever plane they may function. The spirit of dogma, which I say so with respect, had affected badly the religious quest and made the mind rigid and their practices conform too rigidly. I find that the rigidity of this dogma which had applied itself chiefly to religion was apparently projecting itself in the realm of politics and economics. And the ideas, intolerant ideas, ideas of rigid dogma, that I am in possession of the truth, of the whole truth, every bit of truth and nobody outside the pale have it, outside our religious pale. That kind of rigidity with certain forms of religious approach narrows men's minds invading life in its other phases too, abutting to a certain extent in the scientific region, thus shutting the doors to that tolerant approach, to that objective approach, to that approach which not only looked into the heavens without fear but

was also prepared to look down into the pit of hell without fear. All this becomes narrower because of this dogmatic and rigid approach to the life's problems, feeling of dislike for any criticism and thinking that the other person who does not accept your thesis is your enemy and has to be combated. And so apparently, the key of life's problem is combat, violence and destruction of the person who does not hold your own opinion. Well, it seemed to me that somehow people in the Buddha period were more advanced in tolerance, not in technology, not in the development of science but in some other phases, not only in compassion but in the tolerant approach. It struck me then that quite apart from the religious issue, there might be something worthwhile in the pagan view of life; not, as I said from the religious point of view because the pagan view of life is a tolerant view of life. While it may hold one opinion, it respects the opinion of others and thinks there may be truth in the others' opinion too. It looks at the universe and the mysteries of the universe, tries to fathom them in a spirit of humility and it thinks that truth is too big suddenly to be grasped and whatever one may know there is much else to be known, and others may possess a part of that truth. And so, while it worships its gods, it also does honour to the unknown god whom they do not know.

I mention this, I venture to say all this to you, because in the last two days, physically and mentally, I have wandered between various centuries – 2500 years ago when Buddha was here and 1300 years ago when that great University of Nalanda was flourishing and attracting students from distant countries. Indeed, I was there this time to celebrate the occasion of a great traveller from China who became a student of the Nalanda University and spent seven years there and has written his experience during that period. And then the next day, this great engineering feat, the Hirakud Dam, and other advances in engineering or development of science and technology that are taking place in India; and then my mind travelled to the problems we have to face in India and the world. The overwhelming problem, of course is this; whether we or any other country or people will continue to function in peace serving at the altar of science and using that for the good of humanity, or whether we shall distort the power that science gives us and use it for evil purposes. The scientist is supposed to be an objective seeker after truth and science has grown because in a large measure the great scientists have sought truth in that way. But no man, I suppose today, not even the scientist, can live in a world of his own, in some kind of ivory tower, cut off from what is happening and cut off from the effect of his own work which is so powerfully affecting the destiny of humanity. And therefore science today has perhaps begun to overlap the borders of morals and ethics.

If science divorces itself completely from the realm of morality and ethics, then the power it possesses may be used for evil purposes. But, above all, if it ties itself up to the gospel of hatred and violence, then undoubtedly I feel it has taken a wrong direction and that will bring much peril to the world. So, I plead with scientists here and elsewhere as they journey to the temple of science, which they must, to remember that this temper is essentially or shall be essentially one of tolerance, one of humility to the great truth which they are seeking to discover and which they are unveiling from day to day realising that much remains still for them to discover in future. And always remembering that somebody else may have a bit of the truth; they do not have a monopoly; nobody has a monopoly; no country, no people, no book. Truth is too vast to be contained in the minds of human beings, perhaps, or in books, however sacred they might be.

I remember that once a deputation went to Cromwell, the English dictator, some hundreds of years ago, and insisted on his taking a certain line —rather hard line. Cromwell replied, it is rather well known; he said 'I beseech you gentlemen in the name of Christ to consider whether it is possible that you may be in the wrong.' But, we all think ourselves in the right. It would not matter so much if we did not want to impose our right on the other persons forcibly if necessary. That creates conflict and when you have a great power, the conflict is all the greater and the consequence and the disaster are all the greater.

Let us be a little humble and let us think that truth may not perhaps be entirely with us. Others may possess it too. Let us cooperate with the others. Let us, even when we do not understand what others say, respect their views and their ways of life, etc.

To come back to an ancient age in India, Asoka's period, 2300 years ago. This man, who was infinitely more than an emperor lived in India and he has left memorials of himself and his thinking all over this great land— memorials which you can see today – great pillars of stone carved with his message or on the rocks or elsewhere. You have the identical messages which he gave them. Among the many messages that he gave, this one which I think we should all remember, not only in this country but elsewhere—remember the period when he spoke—2300 years ago—people in those days spoke more in terms of religion than other matters—but, what he said had a wider application—addressing his own people he told them, 'If you reverence your faith, while you reverence your own faith, you shall reverence the faith of others also. Reverencing the faith of others

you exalt your own faith and you will get your own faith honoured by others.' I do not quote the exact words, but this is the essence of it. Now apply that message of toleration not only to the field of religion but to other activities of human life today—politics, economics and science, and you will find that it puts things in a different context. It is a context which is not very much in evidence today in the world where opinions that differ are not liked, where ways of life that differ are not liked, where the tendency is to suppress the view or the opinion or the way of life that is not approved of—where ultimately science itself becomes vitiated by this narrow outlook. That would have been bad enough at any time, but when we have these new weapons, new weapons forged by the work of scientists, hovering above round about us, and the possibility of their being used, then it becomes a far more important and vital thing how people think today, how people react to other people's thinking, whether their mind is full of hatred and violence and intolerance or whether they grow more in tolerance and in appreciation of others. Then it becomes much more important today than in Buddha's time, or any other time because a mistake today carries you very very far, may carry very very far.

And so the burden falls a great deal on scientists, men and women of science who have given to humanity many good things and will no doubt give more good things of life but who have also given great powers which may be used either for good or for evil. And it is not good enough for the scientist to say that: 'I have done my job by unveiling truth or releasing a source of power.' It is not good enough for him to give power for evil use. He may not control it, of course, and he has to go on with his quest for truth, whether it leads the world to destruction or not, because it is absurd for our scientists to stop research for truth simply because humanity may use his discoveries for evil. That cannot be done. The world marches on, and so we have got caught in this inner conflict today, nationally and individually. Many individuals and countries cannot keep pace with the changes that are taking place today. We adapt ourselves outwardly to the changes, but mentally we do not keep pace with them; nationally we do not keep pace with them.

The rhythm of history goes on developing and each individual country sometimes does not fall in line with that rhythm. It may be, it lives in some old rhythm of its own, and thus conflicts arise. While chiefly because of the work of the scientists, development in communications and others, there is to be fundamentally one basic rhythm for the whole world today or else there is conflict.

I ventured to place before you some thoughts that were crossing through my mind and troubling it, more specially during the last two or three days as I have wandered from 500 years B.C. to today and seen these various centuries at work in India and to some extent in the distant world. But here we are in the middle of the 20th century. After all, past is there only for us to learn from both from successes and failures. We have to live in the present and we have to build the future. And here in India, as no doubt elsewhere, people are engaged in building this future and we are seeking your sympathy, your cooperation, your earnest and passionate attention to this great work of building not only our country but building up the world of peace and tolerance and compassion.

12. Inaugural Address at the 45th session of the Indian Science Congress held at Madras, 6 January 1958*

Mr. President, Mr. Governor, Pro-Chancellor, Vice-Chancellor, and distinguished scientists:

Every year I appear on the scene (Cheers). I am invited by the Science Congress authorities. It has become some kind of routine or habit for them to invite and for me to accept their invitation. (Laughter). It is easy to fall into these habits and difficult to break away from them. It is not quite clear what precise function I perform except, I hope, to try and cheer you up a little and to indicate that the Government which I represent is favourably inclined to science and scientists. Perhaps, that is the principal virtue that I possess in this gathering. Nevertheless, I feel rather out of it, in the sense that I do not want to come here as the Prime Minister. I would rather come in some other capacity, but if I were not the Prime Minister, the other capacity would not lead to an invitation. (Laughter).

Anyhow, I come here and pretend to be a scientist and try to shine in the reflected glory of science. Even now, as I am standing before you I am wearing a robe to which I have no right whatever. (Laughter). Not only I have no right—I do not think, anyone in India except those who are very strong can wear it for long. (Laughter). It is, I can assure you, the heaviest thing I have worn for many years. (Laughter). I am told it is an Oxford robe. Well, it may suit the climate of Oxford, but it will not suit the climate of Madras. Apart from that, I have not had the honour of going to Oxford. I have a fair selection of all kinds of robes; but Oxford is not among them. I do not mean to say that I am inviting the University of Oxford to provide me with one. (Laughter).

Inaugural Address by Jawaharlal Nehru was followed by the Presidential Address delivered by Prof. M.S. Thacker on 'Grammar of Scientific Development.'

*Proceedings of the 45th Indian Science Congress, Part I, pp. 31-37; Transcript of the speech, Nehru Memorial Museum and Library, Teen Murti House, New Delhi.

Anyhow, I come here because honestly I feel that by my coming, I may not perhaps do much good to you—but I think that I do good to others, who are not here. That is to say that I make many other people in India, who may not be interested in science think of it, and that is I think a worthwhile task.

We are an odd country as all of you know. In most things we adopt extreme attitudes. We function sometime in a way which was common, I suppose, a couple of thousand years ago. We still function like that in some ways rightly, and in some ways wrongly. Every century is represented in India some way or other, including the latest, the present. We talk of the latest techniques and scientific discoveries, and indeed our scientists are successful in this pursuit. Yet some of our practices are quite remote from science or anything like it. All our yesterdays bear down upon us, upon our todays and try to push their way into our tomorrows. And yet, tomorrow – today and tomorrow – change us and affect us. I suppose to some extent this is true of most countries. But, in this country particularly, where we have both the privilege and the burden of a very long past, this is very obvious. We profit by the experience of that past and we are also rather borne down by its weight. Anyhow, science today has established itself; established itself I mean in the minds of those who only think of success in terms of some obvious material good that comes out of it. We live in a world of science—we are the children of science, technology, and all that.

And no doubt the latest achievement of science—what is called the Sputnik—this first adventure of man's effort into the outer space has also suitably impressed millions of people in the world. Science is something which cannot be ignored. But even so, I think most people—I am not referring to scientists of course—look upon science as some kind of tool to further their own particular interests, not the individual interests—I mean their particular ideas; tool in the sense of technology coming out of it and adding to man's power to achieve things that he wants. And in this way, science, I think, though it does of course still function, it is rather distorted when it is sought to serve particular ends, particular beliefs and particular ideologies. There is no such thing to my thinking as capitalist science or communist science or any other science. Science is science, just like truth is truth. If you call it as capitalist truth or communist truth, it may be some fraction of truth. It is not fully truth. You are excluding things from it.

Now, I referred to Sputnik. It has been an interesting experience to see the

reactions of this on various peoples, various countries. Every scientist, of course, acclaimed it and others as a great advance and something commendable and highly to be praised. Nevertheless, it is so tied up with other matters, that it was considered from the point of view of politics and world conflicts and power conflicts and all that. And the essential nature of it, the scientific part of it, was rather covered up by the political or the like aspects, which is unfortunate and which led some people to some reactions of fear that it is a terrible thing which can be turned into a weapon and used against us and all that.

How should we look upon science? Although I may not be a scientist, I certainly hope, I have approached this question in what I may call the temper of science. And apart from that, being a bit of pagan, my mind is open to all ideas. It does not reject any idea, unless after examination, I do not find it good enough. That is the virtue, I may say so, of a pagan outlook. It is an open outlook. It does not deny anybody's right to search for truth in his own way. It does not deny anybody his way of life in his own way. It does not try to impose his ideas of truth or his way of life on others unless they accept it gladly. Whether that is a virtue or not, I do not know.

I merely described is what I think perhaps is a certain way of looking at things, which India has possessed together with many other wrong things and bad things. And so, the question arises that when you talk about science, what exactly do you mean and what exactly are your approaches? Certainly we want science to be used for the betterment of human beings, or humanity. Pure science is important, because the search for truth is always important. Nevertheless you want to apply it for the betterment of human beings. That is not only justified, but it is right. On the other hand, if in the pursuit of that objective you make science and the pursuit of truth a kind of handmaid to set policies, which you have in mind, political or other, then perhaps the temper of science is affected and the approach to science is not exactly what it should be. I am merely putting some ideas for your consideration because they come to me sometimes and trouble me.

Today, suppose science becomes intimately tied up with various world conflicts today, becomes part of what is called the cold war. Apart from the cold war being not a thing that is desirable, it will be bad for science if it is tied up in that way. So, one sees on the one hand people sometime praising science, and at other times becoming very apprehensive, because science has led to the discovery and use of tremendous powers of nature, whatever, they are, which can be used for good or evil, which can produce

terrible weapons of manslaughter. Surely it is not the fault of science; it is the fault of the human beings who misuse science. Science is neutral—truth I suppose is neutral. It is truth. There is no question of its being positive or negative. There it is everything together and you can discover various aspects of it. So it is no good blaming science, because, if you blame science, you may as well blame knowledge, all kinds of knowledge, because knowledge misused becomes dangerous. Yet, we want knowledge, we want science. Instead of blaming science, we should improve ourselves, get to know how to use it properly and not allow it to be misused.

Being a politician, naturally these problems come up before me, though not in the acute sense in which possibly they appear to others, who have to deal with them in a more concrete way. I have no hydrogen bomb or other kind of nuclear weapon nor am I thinking of them, nor am I likely to have them. So, it does not worry me. But, nevertheless it worries me that somebody else's hydrogen bomb may come down on my head. (Laughter). That is not particularly likely, so far as my head or Indian heads are concerned—I admit that because those who possess the hydrogen bomb have no particular hostility, animosity towards us in whichever camp they might be. Nevertheless, the fact remains that we do live in an extraordinary age when the skies are filled continuously by hydrogen bombs carried by jet planes night and day. It is an extraordinary thought that even a slight accident, incident, loss of nerve on the part of the commander of the aircraft, might lead to terrific consequences. All this is done, I suppose, as a measure of precaution. It does seem very strange that we have been reduced to such a state as to take these enormous risks as a measure of precaution. They say so. It is no good blaming science for this. Science necessarily must go on, for, the moment science ceases to go on, we become static and no doubt we shall decay. We have to adapt ourselves rather to the approach of science and to the ways of science, and try to benefit by it and not use it for evil purposes. As to how that is to be done, I do not know.

I suppose the Vice-Chancellor, when speaking, he was telling us how the Science Congress started with six sections and then added more and more other sections. I wonder when the Science Congress will also have a section trying to probe into the ways of the human mind and the human spirit, and whether that attempt of scientists will meet with success. Because obviously there has been some kind of big lag between the achievements of science and the capacity of the human mind to adapt itself to them in the right way. Scientists, therefore, good folks as they are and very competent, may gradually develop something of the wisdom of the sage, something even of the compassion of the saint. Science thus far, I

believe, does not deal with saintly things. Sometimes those who deal with them so often delude themselves and go astray that it is rather dangerous to go along that path. Yet the fact remains that a good deal of wisdom is necessary, and a good deal of compassion is necessary and not merely scientific discovery and achievement, good and essential as scientific achievement is. Perhaps we have come to a period, when, unless something is done in that spirit, there might be very big disaster.

Well, it is not for me or even for the Science Congress to do much in that respect. But it is good at least to express ourselves and to think about it and thereby create some kind of opinion in its favour so that others, who are in possession of greater authority may also be affected by these thoughts. I believe that millions and millions of people are thinking along these lines and there is no special virtue in my saying this here, although Indians, our countrymen, are in the habit—a bad habit—of imagining themselves more spiritual than others, which they are not. All that they do is to recite some old verses—and call it spirituality. Very good, very fine verses full of wisdom, but, mere recitation does not make oneself spiritual but it is the life that one leads. And, we imagine that we have, rather come-down in the world in the last thousand or two thousand years but how high up we were. That I think is sheer delusion. We had our virtues undoubtedly and inner strength, I believe, also. Otherwise, we would not carry on in the way we have done and we should nourish that inner strength. But the fact is that the world—not India—has come up against a serious impasse, deadlock.

And, it is not the scientists as such, although they can do much, who can deal with it by their experiments; but something that affects human mind and human emotions in the right direction. We, in India, in our own generation have had experience of individuals, who were not scientists but who had a powerful effect on people's minds and emotions in the right way. Take Gandhi, an amazing man, and in his own way a scientist, not with test tubes and laboratories, but human minds and hearts. There is even now a frail man wandering about on foot, Vinoba, standing out from all the rest of us. We may be Prime Ministers, Governors and Chancellors and Vice-Chancellors and persons of high status. But, somehow sometimes we feel very small before a man like Vinoba, who is a very learned man, but whose shining quality is compassion. And we see how these qualities are sometimes greater than all the learning we may possess, though we should have the learning also.

So, I wonder about the tremendous achievements of science. They are magnificent. They have done enormous good to humanity. Have we not -

been lacking in some direction? And, must we not try to fill that lack to make it more wholesome for the future? I referred to the Sputnik, the great advance that Russian scientists have made as a tremendous step forward. A great argument sometimes arises as to why and what the effect of it is, as to what there was in Russia that enabled them to do it, and why do not other countries do it, and frantic attempts are made to do it? I have no doubt that Sputnik, as it is called, well, other countries will also produce these space satellites. If one country does it today—one batch of scientists—others will also do it, given the facilities. Sometimes one may be a little ahead and sometimes the other. Nobody speaks of this as a kind of rivalry, except, unfortunately for the political temper in which we live today. Otherwise, everybody would have welcomed it and learnt from it and the other countries and other scientists would have gone ahead. Why do countries make progress in science? I suppose there are many reasons; but primarily, I suppose, because science is encouraged, science is considered important, and scientists are respected and given status, so that more and more people are attracted to science and out of that large reservoir the brighter people go ahead and geniuses come out. You cannot produce a genius obviously, but you can produce a large number of people by giving them opportunities and those who have the capacity will go ahead. And I think that essentially is what has happened in Russia—Soviet Union—greater opportunities are being given to science and scientists. And any country which will give opportunities will achieve results. In America, they have opportunities, of course. There have been great American scientists and also great scientists of England, of Germany, of France. But, so far as I know, in the Soviet Union, probably, far more opportunities have been given and are being given, and I am told that in the Soviet Union, even the material rewards come more to scientists than to almost anybody else. So, there is all this encouragement.

So the advance of science and the question of advancing of science, first of all, depends upon your decision, your feeling that science is important. That must be there and I do not think of it merely in connection with providing you with some slightly new device, to improve some technique, so that you can make a little more money. That is very good and I have no objection to it; but do not look upon it as some kind of tool to do this or that—it is something more vital and important. So you must consider science and the spirit and temper of science as important. If they are important, then they should be given an important place in your structure—political, economic or whatever it may be—your social structure. Facilities should be given for the advancement of science, the scientists and the universities wherever this work is done. And, the

scientists should be duly honoured and not considered some kind of camp follower of some concern.

This is the lesson which I think we should draw from the recent events. First, if I may repeat this, that we should look upon and keep science apart from these political conflicts, cold wars and the like; keep it apart in so far as we can. Secondly,—this of course is a very difficult thing—science and scientists from being neutral agents, should well develop the quality of the sage and the saint. It is a very difficult thing. Still unless something of that quality comes, you are not quite fully grown into full human beings. None of us are, of course; we have all grown very lop-sided. And, thirdly, it is the function of the State to encourage science in the ways I mentioned—to encourage it not only because it is the right thing to do, but even from the narrow opportunist point of view that it is becoming important to do so. If you do not, you get left behind, you get weak.

We are engaged in this country with, what we call, our Five-Year Plan and we have to struggle hard, because we are low down in the scale of things in regard to our methods of production and other things connected therewith. Whatever policy we adopt we have to struggle hard. The question is what policy we should adopt, which will give us the best results and as soon as possible. We experiment, we succeed, we fail and we try again in a better way and do not adhere too much to any rigid approach so as to profit by our failures as much as by our success. It is a hard task. It can only be achieved by what might be called a scientific approach. And a planned approach means, after all, a scientific approach, a logical approach, a thought-out approach. Some people imagine that planning is something wrong or evil. They do not understand it. A particular plan may be good or bad, but planning is essential in human life. So, we are trying to do it and in doing that, therefore, while inevitably others have to play their part, the scientists have also to play their part fully and increasingly.

I know that our background in India has been different. It is changing of course. It has been different because both science and technology had been backward and have not been encouraged adequately. Now they are being encouraged to some extent. And it has been thought here that all these mighty problems should be settled or solved by wise men sitting at the desks and writing long notes on big files. Sometimes that may be necessary but it seems to me that we will achieve more, by the wise man either going to field and doing a bit of digging that is, if he feels interested in agriculture; or doing something else instead of merely writing on files, which pertains to the administrator. So, I think, that the emphasis in our

country should gradually shift, because in the type of society we seek to build that emphasis has to shift. It cannot be the old emphasis. Everybody recognises that, of course. But again, it is difficult to get out of our old habits. It is even more difficult to get the set methods of the country's government bureaucracy—call it whatever you like – to change. They should inevitably change because of pressure, and they are changing and they will change more. Here, anyhow, I have been trying to look at these problems in this larger context. We suffer today, on the one hand from a lack of trained personnel—engineers and the like; scientists and the like; and yet they are hardly used enough, we have plenty of unemployment in our country. That shows a lack of proper organisation and planning. Obviously, that cannot be done quickly. It takes time.

However, I am not going to talk to you about the problems we have. I am here again to express on behalf of myself, and if I may, on behalf of my Government, our appreciation of the work being done in the scientific field in India by you and others who are not here, and I hope that this will increase and we shall certainly try to help you to the best of our ability. I am very glad that distinguished foreign scientists have come here, both because we profit by meeting distinguished people, by hearing to them, by talking to them we broaden our own horizon, and also as an indication that so far as we are concerned, the Republic of Science knows no frontiers or boundaries. (Cheers).

13. Inaugural Address at the 46th session of the Indian Science Congress held at Delhi, 21 January 1959*

Mr. President, Mr. Chancellor, Your Royal Highness, Excellencies, Distinguished Delegates, Ladies and Gentlemen:

Year after year I have been honoured by this invitation to come and inaugurate this annual session of the Science Congress. And I have felt it a privilege to come here because, partly of an outstanding interest in science but much more so because of the realization of the great importance of science to the world and to our country in particular. I suppose today there are very few persons who do not realize this great importance of science because now, in recent months and years, science has entered into a strange land which perhaps was associated, in many of our minds, with fiction,—science fiction you may call it—and in its actual achievements it has gone beyond the biggest story that we had imagined. So there is no doubt left even in the minds of the uninitiated as to what science is, what science is doing and what science can, and probably, will do. Therefore, about the importance of science, nothing need be said now. Science has driven out, one may say, broadly speaking, many of the gods before whom people bowed and itself assumed a god-like pose. Like Janus, the god of this month of January; it has two faces, the face of the Creator and the face of the Destroyer and both faces look down upon us and often perhaps, we have to make a choice as to which face we like and which we are going to encourage. On the one hand, we have this magnificent and majestic sweep of science advancing onwards, bringing more and more power to human beings, on the other, somehow we see the misuse, or the possible misuse of this power for destructive purposes. For the first time in human history it can be said, with some confidence, that mankind has the capacity and the power to get rid of the physical ills that the humanity suffers from, to bring about a measure of welfare to all the thousands, millions of inhabitants of this world which nobody could dream of previously. That

Inaugural Address by Jawaharlal Nehru was followed by the Presidential Address by Dr. A L. Mudaliar entitled 'Tribute to Basic Sciences'.

*Proceedings of the 46th Indian Science Congress, Part I, pp. 32-35;
Transcript of the speech, Nehru Memorial Museum and Library, Teen Murti House, New Delhi.

is a possibility and a thing that can be done, provided, of course, one tries to do it in a right way. On the one hand, one also sees the terrible picture of science, the destroyer, and the very weapons and the very power that it gives humanity being trained for the use of such destruction as the world has never seen. We want science in this country, as the Vice-Chancellor was telling you, for a multitude of things, to raise ourselves, to get rid of our many ills and difficulties and we are passionately attached to this work of uplifting our people and ourselves and, indeed, we look forward to others doing the same. There is no question of competition or rivalry with any other country.

In doing so we want the help of others. Apart from rivalry or competition, we want it to be a process of cooperation and in this Science Congress, therefore, particularly we welcome the distinguished scientists who come from abroad. And we hope, and we are sure, that their visit here, will help us in the understanding of much and in our future work. And here may I offer my respectful congratulations to the great scientists of the Soviet Union, of the United States of America, of the United Kingdom for the magnificent advances that they have brought about recently. And yet again, an odd thought comes to the mind. We are stretching our hands to the moon and some day we shall go to the Mars next or Venus; we shall conquer these great spaces round the earth and yet, perhaps, we forget what is happening on the earth and we cannot fully manage the earth properly. There is this dual aspect facing us all the time, and we find also, while on the one hand this tremendous and magnificent and inspiring advance, sometimes evidences of some decay, some inner decay of the mind, of the spirit, some cracking up of the social structure, some lack of integration in the human personality or the national personality—these processes, contradictory processes going on at one and the same time.

It is obvious that science and technology in the last 200 years or so have changed the world, changed it for the better—I do think much for the better. It is obvious that that process is going to continue; it is going to continue whether we like it or not but anyhow I think we should like it and try to direct it into right channels. And if in the last 200 years it has effected amazing changes in the structure of the world, of the society, the pace of that change has become much greater today. That too is obvious. Therefore, we must realise that in the next generations, maybe a little more or little less, vast changes will go on coming here changing the way you live, because the way we live affects our thinking—the way we think. Are we, therefore, at the dawn of a new civilisation or is this the twilight of the old or both? Do we see round about us, in all this toil and

trouble, the birth pangs of a new order or something almost resembling the death agony of the old? I do not know. Being given to a measure of optimism, I hope, it is the dawn or the birth pangs and not the other, but, anyhow, it is going to be something different. It is not going to be the same thing carried on and it cannot be our living from crisis to crisis. We can survive one crisis or more, but we imagine that the future of the world is one of always jumping or trying to escape from one crisis and then having to face another, that will, probably, lead us in the wrong direction.

We have seen in our generation amazing things happening. I remember the great scientist who is supposed to have brought about or produced the first atomic bomb, and when, he saw that first experimental explosion, suddenly thinking of some words in our *Gita* about the splendour of a thousand suns blazing out suddenly all together in the sky, splendour of a thousand suns which was used for destructive purposes, not for the glory of the earth or mankind. And all the time there is conflict in his mind, which way do we go? With everything and all the riches and the greatness in the shape of welfare and progress before us; yet must we go the wrong way or must we take these mighty risks that we have to take today? I do not know of course. But I do know this, there is no getting away from science and the march of science. It is only through that that we can, not only solve our problems, but even the world's problems. But in doing so, science also and those who are the high priests of science, must also realize that there is something as a social consequence of the scientific work and their discoveries, not something only, a very big thing. That there are even in science some moral issues involved. It is true that science essentially is a pursuit of truth. And it has that other aspect to which the Vice-Chancellor referred. And if you pursued truth, you cannot shut your eyes to something you do not like, you have to take the good and the bad, both. But in pursuing it, science, surely we have to keep in view certain fundamental aspects and realities which we value. Is truth or the pursuit of truth, to be tied up with the pursuit of hatred and violence, or should it accompany charity and compassion? There are ways of doing the same thing, I suppose, even for scientists there are two ways open for making these approaches and the choice has to be made in this present generation of ours, I think, lest all this majesty of science may go the wrong way; when it is open to us and seems not so difficult to go the right way.

In the old conception in India, and the old conception of the *dharma* was, I believe, the conception of duties and obligations, not so much rights. And perhaps if we could lay greater stress on our individual and on our national duties and obligations, and not so much on rights only, it might be a little better for the world. So I have ventured to place this

idea which is common enough today and which must be in your mind; but it troubles me as often as it must trouble you. Because I have felt that, in these tremendous successes and victories of science, we may not, the scientists or others who use science, become too arrogant and challenge something that may later overwhelm them. In our own old Indian mythology, there are innumerable stories of people who gained by various means, a great power and having gained that great power, they challenged the gods and there were mighty conflicts and they were humbled because arrogance ultimately, according to those stories, is humbled. May not science and the scientists or those who use the methods of science forget this lesson of history. Today we see these wonders and, at the same time, new problems arise. We talked about this twelve or thirteen years ago -the atomic bomb burst upon the world. Today the atomic bomb is almost a coventional thing, is out-of-date, the hydrogen bomb takes its place and I have no doubt tomorrow the hydrogen bomb will be a casual thing. Something else, mightier and more destructive, will take its place. So it goes on step by step. Meanwhile, all this business of nuclear weapons, nuclear tests, is piling up, a lot of waste materials,-radio-active material— and I speak as a layman of course—but all this piling up of waste radio-active material which is full of destructive, powerfully destructive tendencies and which lives for ages and ages before it exhausts itself. What is going to happen to it? Scientists no doubt are wondering about it and maybe you will find out a way. But it shows that in this great advance of science, new problems, and difficult problems are arising which may well prove almost impossible of solution if we do not take care right now. So, the world changes before our eyes but perhaps we do not change with it. The physical world changes, the material world changes; how far do we adapt ourselves to it? The world is full of displaced persons today, displaced, physically displaced, in India, in Europe, in other parts of Asia. But there is another kind of displacement that has gone on and that is going on, displaced in mind, and not in physical body which leads, which is leading to inner conflicts, inner difficulties in individuals, in groups and in nations. So perhaps it is due to the fact that we have not quite caught up to these wonderful discoveries of science. Perhaps, we may catch up. Anyhow, these are the problems and if science has created them, science has to solve them; nobody else can. But science taking a wider sweep, science not merely looking at the heavens and at the microscopic things through its microscopes, not merely losing itself in the higher mathematics, not merely producing all kinds of calculating machines and brains— calculating brains, which it does with remarkable success, I have no doubt it will produce a complete robot who can think and act like a human being with complete accuracy. But the fact will remain that perhaps that misses something that is an essential part of the human being. And so

science has also to look at the heart of that human being, at the spirit and the mind of the human being and try to integrate it with all the other advances it is making.

I welcome you again, distinguished delegates, and I wish you success in your labours. (Cheers).

14. Inaugural Address at the 47th session of the Indian Science Congress held at Bombay, 3 January 1960*

Year after year I have come to inaugurate the session of the Indian Science Congress, not because I can add to the value of the deliberations of the Congress, but in order to convey the hospitality of our Government to those who come from outside to participate in its deliberations and to show also the interest of our Government in the cause of science and scientific development.

I welcome you and assure you of our abiding interest in the work you are doing. I recognise the importance of your work more and more not only in the realm of science but in the application of science to the betterment of human beings.

The Government recognises that it is necessary to give opportunities to the people in this country to advance in the various ways of science and Government has given this opportunity to the people.

My own main interest in science arises naturally from the social consequences of science than science itself. We have to face major political, economic and in the main social problems of a growing country and of raising the level of hundreds of millions of our people. It is clear that we cannot solve these problems without taking recourse to science and its application. So, inevitably we are driven to the men of science to find out how we can tackle these major problems.

Science has advanced to a stage where it has brought promise of enormous good to humanity and also a fear of disaster.

In pursuing science, the scientist must keep this aspect of science in view. This is vital for human existence. I agree that there should be some amount of detachment and objectivity in the search for scientific truth but

The Inaugural Address by Jawaharlal Nehru was followed by the Presidential Address by Professor P. Parija, entitled 'Impact of Society on Science.'
*Proceedings of the 47th Indian Science Congress, Part I, pp. 30-31.

at the same time the scientists should be concerned about the significance of their work to human beings. I believe they will not work with complete detachment of mind and be unconcerned about the fate of human beings. The scientist is also a human being with human feelings and so naturally he must relate his work in some form or other with the advancement and betterment of human beings. This problem has come up before the great scientists who are concerned about this matter.

I agree with the Governor of Bombay as stated in his welcome address that scientists must help overcome the social problems of the people more than anything else.

For various reasons India has remained static in the past. Its growth had been impeded for a long time because of various causes. Now when the opportunity has come for its growth, the country wants to grow fast and it is growing fast in all possible ways.

I believe science is growing fast in this country. It has done well during the last ten or twelve years and is beginning to show very significant results and I have no doubt it will grow.

Here in Bombay, not far off from where we are meeting, you may go and see the development of work in our Atomic Energy Establishment which represents, I think, a significant development. It will no doubt be very helpful to us, because we consider this matter not merely as research in science, not certainly from its military aspect but naturally from the point of view of utilising the energy derived from it for civil purposes. That is a vital matter if you look into the future.

While India is developing the latest methods of power generation through atomic energy, the cow-dung continues to be the principal fuel in this country. Similarly, in the jet age, one can find the bullock cart. These wide contrasts one finds in this country are natural because India has remained static and is now attempting to grow rapidly.

I have no doubt that this process of development will gradually remove many of the anomalies that exist in Indian society today. These anomalies are there, and the best way to remove them, I think, is the way of science.

15. Inaugural Address at the 49th session of the Indian Science Congress held at Cuttack, 3 January 1962*

I am here to attend this annual session of the Science Congress again. Last year I could not be present although in the previous years I had made it almost a regular practice to come to these annual sessions. I come here for a variety of reasons. I would, of course, have liked to stay on some time and try to imbibe some wisdom. But as I cannot do that, I do not wish to come in the way of learned people discussing learned subjects which perhaps I might not be able to understand. So, I come here really to convey my own and our Government's greetings to you, scientists of India, and our foreign guests, and to tell you what great importance we attach to the growth of science here in India. It is growing, of course, and growing fast, and yet we have much leeway to make up.

Today almost everyone, almost everywhere in the world pays obeisance to science. The world we live in is one moulded very much by science and it is its offspring. So the mere idea of encouraging science as such by paying obeisance to it, is necessary no doubt, but still not so necessary because it is the accepted tenet today that we have to worship at the temple of science. That is so, and it becomes more so, because the pace of scientific development becomes faster and faster. As you all know, we are now apparently on the verge of some kind of space age and human beings have gone into space—some distance anyway. There can be no doubt that this is a tremendous achievement and may be followed by still greater triumphs in other directions. Now there is no doubt about the advance of science. But doubts arise in my mind—and in the minds of many people—about the use that science might be put to, for the benefit of humanity. Science has to be pursued anyhow. We cannot escape it; it surrounds us; it presses and oppresses us. Science ultimately is a search for truth but sometimes that search leads us to an uncomfortable conclusion; because one has to search for truth and search for it without fear and as objectively as possible.

Inaugural Address by Jawaharlal Nehru was followed by the Presidential Address delivered by Dr. B. Mukerji, entitled 'Impact of Life Sciences on Man.'
*Proceedings of the 49th Indian Science Congress, Part I, pp. 31-38.

In India today, there are, I believe, considerable numbers of young men, and I am glad to say young women, who are doing scientific work of high quality. I particularly welcome these young women. Sometimes I have heard, and I say so with respect, that these young men and women are not given their fullest chance by the senior men roundabout them. This, if so, is unfortunate. Because it should be the pride and privilege of senior men to train and give every chance to the juniors working with them. Because really there is—I have no doubt—in India the material—the human material—peculiarly suited to scientific research and scientific progress. And now if that is what is happening, it would be a great pity if they are not given a good chance everywhere to go ahead. I do not know how far it is true; but I am told that many of the major discoveries of science were made by people who were comparatively young. They did good work afterwards too. But they started it at a fairly early age. It is, therefore, most important that we should encourage our young scientists and give them every facility to do research or any other work in the scientific field that they may be preferring to do. There is this aspect of research work.

Then there is another aspect which is particularly important in India today, that is the application of what you find out, for the benefit of our nation's work. That is very important, but it often happens in India that even when fine research work is done in the practical, or theoretical field, it remains only in the laboratory. That is not very good.

There is also another matter which weighs down in my mind, about which I wish to say something.

Science, as I said, is ultimately a search for truth, and further application of that truth as far as possible for the benefit of humanity. Well that has not always happened and it is not happening today. And the result is that we have to face tremendous problems in the world which create a sense of great instability and insecurity in the minds of men and uncertainty about the future.

Now, science is quite uninterested in this aspect and functions by itself—regardless of what might happen to the world or humanity. That is an important question, because too much interest may lead to science becoming less objective. That too, is not good because we have before us all sorts of problems and conflicts arising in men's minds and in society and it is for science to deal with these matters. Ultimately, I suppose, it is really a question not directly of scientific research and the like, but some kind of change taking place in human thinking and the urges which the human beings have. Right from the earliest times, wherever you went,

whether in Greece or in ancient India, one thing that was uppermost was 'Know Thyself'—whatever it meant. Evidently, that meant some kind of control over one's self. More and more we are controlling nature and its ways of utilising them, but apparently less and less we control ourselves. Those who use those forces of nature thus create a curious situation. Just when we have the power and the ways and means at our disposal for mastering those forces of nature, of removing the causes of hunger and poverty, just then something else comes up and diverts our energy and mind in other directions – dangerous directions – which may lead even to doubts if man will survive at all and will not destroy himself. That is a very serious situation for every individual who thinks about it, and I have no doubt that scientists think about other matters apart from the subject to which they devote themselves.

Nearly all of us here, those who are Indians, know the name of the person I am going to mention. Maybe some of our foreign guests may have also heard about him, although he is not particularly known in foreign countries. India has a habit of producing odd men. One of the oddest men India has produced was Mahatma Gandhi. I rather doubt if that kind of persons would appear on the scene in other countries. So today we have another odd man, more or less in the same tradition. He is known as Acharya Vinoba Bhave. Now, I am mentioning his name for a particular purpose; he is a man who, in this age of jet travel is going about from place to place without using any of the new methods of communication. He has in the course of last 13 years walked all over India not even taking an automobile so far as I know, nor any kind of conveyance or railway. He has walked all over this enormous country—which is a very odd thing to do in this age of science and swift travel. He has walked from village to village day after day. He is not young by any means. But some kind of strength keeps him going and he has visited almost every place in India—visited a vast number of villages, sat down and talked to about half a million of villagers, during the last 13 years. I think he has walked thirty thousand miles, or maybe forty thousand, by road. Essentially he is a man whom one would call a religious type of man, devoted to certain values, certain standards of behaviour—which normally would be called a religious approach. Yet he is going about saying something which rather takes us aback. He has been saying that politics and religion are out of date and they should be replaced by science and spirituality. It is a striking thing to say. He is not a scientist; he is a great scholar, he knows many languages. But to say that politics should give place to science shows the value he attaches to science and replacing religion by what he calls spirituality.

Obviously, when he says that religion is out of place he means the form of religion. He brings in some kind of control through spirituality which is by no means opposed to religion but is rather in conformity with it. In other words he wants society to give science its due place and he wants some element of direction to it, with clogs on it to prevent it from going astray so as to maintain some standards of human behaviour and thinking, and that it profits by what he calls spirituality. Now I am not trying to explain what he meant. Perhaps he may mean something else. But because when for the first time I heard him say that the world is a world of science, it impressed itself on my mind. Whether the world survives or dies, it would be by science. Yet, undoubtedly we have to face tremendous problems. If we are not guided by some kind of standards and values which come not purely by science, but in some other way, then we may as well miss a tremendous opportunity. I may mention here to the scientists present that more and more I am told that, science by itself, without some kind of ethical or moral approach, may lead us to disaster. How that is to be done is more than I can tell you. I am merely putting these problems before you so that you might give a little thought to them. I myself do not know how this can be brought about in a world where many people have ceased to be religious. To many, religion is pure superstition which, of course, is entirely opposed to the spirit of science. For many it is ritual which again is more or less opposed to the scientific approach. For many, religion is a standard of behaviour. Many of them feel that the way they worship, is something very special from other peoples' religions, and this points to a wrong path, whatever it is.

Now here in India and especially in this province of Orissa, which in old days was called Kalinga, my mind travels to a famous period in Indian history, to a very famous man, who was the Emperor of those days—Asoka,—because it was in Kalinga where his peoples' army waged a war and it was here that he underwent some kind of transformation. In the middle of victory he renounced war. It was rather a remarkable thing for any country on way to triumph. But he renounced war and said henceforth he would have no war and he would only propagate righteousness, whatever his views of righteousness were. He wrote many edicts, and got them inscribed on stone rocks all over India and on pillars. You will find them in the greater part of India, and even in Afghanistan which was then included in India, and in Central Asia. They are very fascinating, these edicts in which he described his own change of mind, why he renounced war in the middle of victory. One particular edict, represents I think a basic approach, the basic Indian approach, to the question of religion. That is the approach of toleration. He said in this edict—and he has addressed, through his edicts, his own people, his own subjects—spread

throughout India. He ruled practically over the whole of India, except a small strip of South India, and a great part of Central Asia. He said, addressing his subjects: 'You must honour and observe your religion.' The word religion is not quite correct—the word he used is *dharma* which has a wider meaning: 'But even as you honour your religion, you should honour and respect the views of others' religion, and the views of others who differ from you. If you honour their religion, they will honour yours'. Now that is essentially a message of toleration, not only in regard to religion but in the matter of one's views too. Nowadays, the conflict is more in the other fields than the field of religion. So, Asoka 2300 or 2200 years ago inscribed this message which stares you today on the pillars all over India. The message is essentially a message of tolerance, and in a sense all this comes out of his wars in this part of India, which he gave up later. It comes to my mind, and I think it is something worth remembering, for us in India of course and even more for others.

Now this country, India, has had a long story, a long history. During these two thousand years, it has seen many ups and downs. Now we are again here at a new stage of our existence, when having attained freedom, we seek to use that freedom for the betterment of our own people and in so far as it is possible, for service to the world and to world peace. It is an exciting thing to live in India today, and to see this changing scene, because it is changing and changing fairly rapidly. One sees, when one goes about, by measuring this change, by looking at statistics and figures. That, I suppose, is necessary. But one sees much more, not only in figures, but in the faces of human beings all over India, the change that is coming over their faces and their ways of living and many other things. Perhaps one of the most striking things, is the vast number of boys and girls who go to schools and colleges today which are growing and jumping up every year. Our schools may not be very perfect and they are often criticised. Our colleges are also often criticised. They are gradually improving no doubt. But the fact remains that nearly 50 million boys and girls are now in our schools and colleges in India. It is a large number and it is increasing every year. Our own aim is that by the end of the Third Five-Year Plan this figure will go up to 67 millions. This will mean that every boy and girl of a certain age-group will be going to school. That itself is a revolutionary factor; this—that is coming out of one's old rut of mind, thought and habit. But, these are things that are happening and one sees them when one goes out.

India has been a poor country, at any rate, in the near past. From any statistical point of view, we are at the bottom of the scale of poverty, and yet India has retained, in spite of her poverty, some virtues too.

It is surprising to see how people of India, the people of our villages, in spite of their poverty, can sing and dance and laugh. It is a great virtue to see them sing and dance and laugh, in the face of burdens that life puts upon them. But what I was saying, was that I have been seeing them in crowds, all over India and I am seeing them for the last fifty years, and it has been an exhilarating experience to see these changes -- to see that they are better fed and better clothed. They live in better houses to some extent, and better houses are growing up. Their agriculture is improving. Small industries are growing up in villages, in rural areas, apart from the big industries about which so much is said in newspapers. But the most important change one notices has occurred in the attitude of our village folk—and I think more of our village folk, when I think of India, than our city folk, because the city folk can, more or less, look after themselves. I see the process of a measure of self-assurance coming to our village people, I see the self-reliance coming to them too. They do not go about begging from ministers or officials, but realise that they have to do the job themselves. It is only when that realisation comes to them that they do their jobs themselves and progress. No Government can push them to any large extent, nor can any official do the job for them.

Here in India one of the most revolutionary changes has been, what is called Panchayati Raj. There is devolution of authority, decentralisation of authority to a large extent, of our administrative apparatus, in giving power to those village councils. It has gone very far and it is producing a wonderful effect upon them, having themselves the power and not to look up to the officials. So all these changes demonstrate a great change coming over India, and this is heartening, because perhaps, in the final analysis, the biggest thing we have to do is to pull out our people, a great majority of them—out of this tremendous rut of life, which they have fallen into, the static condition, the unchanging condition in which they have lived. As for instance, ploughing in the same way as they ploughed two thousand years ago—maybe three thousand years ago—carrying on the same thing. That is the worst thing that had happened to India. They got stuck in a rut in thinking. We need to pull them out of that rut—to give them some wider vision, and in effect to make them realize that there is something like science in the world which changes things. I find that this is difficult and it is a pretty difficult matter to pull out hundreds of millions of people out of their rut. But it is not so difficult as I thought it first. But these people really are not influenced so much by wordy argument. They are influenced by something, which they can see and feel, and which convinces them. But once they change, they go on.

I am sorry I have been talking about matters which may not be pertinent to the Science Congress. But they are pertinent in my field because, I want the influence of science, to some extent, the temper of science, to spread out all over India. And I think that is going to happen and is happening today, because large numbers of our young men are studying scientific and technological subjects too. The men in the factory and in the field and elsewhere are beginning to be affected, may be to a slight extent. But even this slightest extent, for hundreds of millions makes a vast difference in the end.

So science is obviously important for the world and if I may say so, for us in India too. It is only through science that we can hope to solve our basic problems. After the basic problems are solved there are other problems which are affecting the rest of the world today, but they come really after the primary necessities of human beings are fulfilled. And it is only thereafter that we can get entangled to some extent in more difficult problems. But, we must to a certain extent get entangled because we cannot isolate from the rest of the world. But we cannot at the same time escape our basic problems.

But, one problem still remains that I mentioned to you a little while ago and that is the problem of humanity today, which really has been aggravated by the advance of science, that is, by the power which science has given to the humanity. Science apparently gives all power in the world, but it has not yet succeeded in giving wisdom to the human being. Power has gone far beyond the quantum of wisdom that human beings have. There lies the tremendous danger that power may be misused for any improper purpose. History has throughout recorded the misuse of power. But the difference lies in that the misuse of power in old days did harm, —infinite harm anyway, but now the harm would be much more intense and in the ultimate effect may threaten the survival of man. Therefore, this element of wisdom comes in. And perhaps we might learn not only through science today, but from the words of wisdom that have been said in many countries in the past by great men who have influenced the conditions of humanity.

I am sorry if I have gone rather astray from the normal subjects you have to consider. But I have these matters in mind and I put them before you. Perhaps as was stated in the previous speeches, it is a habit. I hope, Mr. Vice-Chancellor, it is a habit to praise one's country and the great men who have lived in it. It is a sort of habit, no doubt, which one is apt to exaggerate too. But here it is a hard fact. Orissa, the state where you are meeting, is one of the poorest at present in India—economically, one of the most backward. It has great resources and it is pulling up. But it is a

fact that it is economically a backward state of India. Recently they have a steel plant built up, they have got river valley schemes, and other things are happening. But one thing comes to my mind always when I come here, that nearly 2000 or 1800 years back it is the people of Orissa, on the east coast of India that ventured out in their little boats, carrying messages from India, carrying our culture, our architecture, and so many things across the seas all over South-East Asia, and have left their influence on the people—a vast community of people in those countries of South-East Asia, every one of them. If you visit them today, there is this impress of Indian culture. Even the language, that is, the Sanskrit language has affected their language. Their architecture has been also powerfully affected. You will find the finest examples of Indian architecture outside India, in South-East Asia and there are so many other things. It is interesting to see that these people started this great movement from India. It was not a military movement. It was not conquest. But our people left an impression which has lasted till today. For hundreds of years it was a very powerful one. So it is interesting that these people—these enterprising, adventurous people—ventured out from the east coast of Kalinga and built up their communities there. Evidently they must have had tremendous vitality in those days which the Indian people have lost due to a variety of causes which divide them to a bit due to religion, customs, and superstitions. I believe they are in the process of getting back their vitality and I want science to help them in that process.

16. Inaugural Address at the 50th session of the Indian Science Congress held at Delhi, 7 October 1963*

Mr. President, Mr. Vice-Chancellor and Friends:

Year after year you have done me the honour of inviting me to inaugurate the Science Congress sessions and I have obeyed your mandate and come here to pour incense, to burn incense rather at the altar of science and to say how important it is in the scheme of things today. That is so, of course. Gradually this obvious truth is sinking down the minds of large numbers of people in India. After all, this Science Congress itself is holding its 50th session today. Even during these fifty years the world has changed greatly due to science and technology. It is still necessary, however, for us to carry the message of science to vast numbers of our people. While that is necessary, it is also necessary I think for the scientists, those who are gathered here and others, to think of the problems that science has to face in India. It has to face problems all over the world in this changing, revolutionary period of our existence. It has to face the problem of war and peace, and I hope that India, and the scientists of India, will throw all their weight on the side of peace in the world and in this country.

That is so. But apart from that I was thinking how far the organisation of science in this country is as it should be, or as we hope it to be. I see that our President Dr. Kothari's address deals with this subject of science in the universities or some such subject and no doubt he will throw a great deal of light on it. I think that some concentrated thinking is necessary on this subject of scientific education both in our schools and colleges. I do believe that teaching should be oriented more towards science, though by that I do not mean that humanities should suffer at all. A lop-sided education, whether it is just science and not humanities or humanities with nothing of science in it, is apt to leave one, any person in the world

Inaugural Address by Jawaharlal Nehru was followed by the Presidential Address by Professor D.S. Kothari, entitled 'Science and the Universities.'

*Proceedings of the 50th Indian Science Congress, Part I, pp. 32-33; Transcript of the Speech, Jawaharlal Nehru Memorial Fund, Teen Murti House, New Delhi; Jawaharlal Nehru's Speeches, A.I.R. T.S. No. 11198, 11999. N.M. No. 1947, 1946.

today, not suited to fitting in properly with things as they are. Therefore education must be oriented to that end, giving due regard to the humanities. But I was really thinking of the organisation of scientific work, research, etc., in our laboratories, in our national institutes, and in the organisations that represent science in this country. Our laboratories have done good work, there is no doubt about it, they are doing good work. Even in the emergency that we have had for the last year, our laboratories have done creditable work. And yet I have a feeling that all is not quite well with the laboratories, in the sense that sometimes when we search for a director of a laboratory we go on searching for years before we can find him, which shows that there is something lacking, either the men competent to fill the post of director or something else. Why should that be so? Why should that be so after our laboratories have been in existence for, well, most of them, fifteen-sixteen years, and this Science Congress for fifty years? Do we not take adequate care to train up people up to the necessary standards so that they can fill those high posts of directors of our laboratories, or are our methods of selection such, as are not very suitable? I do not know. It is up to you to think. But I do have an idea that even now in spite of everything, we give credit much more to age than to anything else. I myself being pretty advanced in age can say little against age but still the fact remains that in all our government services and others, age and seniority perhaps count for more than they need, specially in any creative work, and science is essentially creative. Too great a stress on seniority and age is apt to defeat its own purpose. I think age for its experience is to be honoured, is to be respected, is to be given suitable opportunities of work. But in a revolutionary period, in a revolutionary subject perhaps it is somewhat better to give opportunities of leadership to younger people. I understand, I do not know, that probably the best scientific work, creative work, is often done in the twenties and the thirties. It is done afterwards too, but the concentrated effort comes round about thirty or a little more. So I would suggest to you to think how you can get out of the governmental way of looking at things. I, being a part of the Government of India, suffer very much from the governmental way of looking at things. I find it very difficult to get over it. But I do not see why scientific organisations should be brought into that circle of governmental working, which normally happens to every organisation that is started here. We started some dozen years ago the Planning Commission here. When we started it, I definitely thought it should not function as a part of the Government. But now it is just like any other part of Government, in fact deliberately it duplicates every department of Government, calling its members—Minister for Industry, Minister for this, the whole thing, and the same thing, the same hierarchy of secretaries, under secretaries, what not, directors, it is frightening.

You see, the building itself frightens one. What was thought of as a close body of people who think and advise Government has grown into a huge organisation with all the departments of Government almost duplicated there, and each one sending papers to the other, which is normal habit of Government. So I had hoped that science at least would escape that numbing influence of the governmental way of working things. I do not know how far we have succeeded. I rather doubt it. I am inclined to think some of our laboratories are gradually succumbing to the governmental way. I think that a deliberate effort should be made for them to work outside this governmental scheme of things. Somehow we all come back to government service rules, when a person can have leave, for how many days, what he will get, and people think more of the service rules than of the work in hand. This is what I find in Government, the average serviceman is very good, I am not blaming him, but he is wrapped up in thinking of the rules and regulations governing his service and his pension and his provident fund and what not. I sometimes wonder how he can find any time to think of anything else. And I have this fear, this may gradually, it has as it has done, affect our scientific workers too. Some years ago, you will remember, we passed a resolution, the Government of India passed a resolution on, I forget what it was called, but it had to do with scientific research and scientific work. The resolution did not go terribly far but it did go some distance in recognising the place of science, scientific research, scientific teaching, recognising the status of the scientist. And in so far as it did that it was good, because previously the scientist or the expert in the Indian governmental way of thinking was some person belonging to a lesser breed. There might be an Einstein in them but he had to keep his place before the administrator. The administrator was the boss. The administrator has to some extent to be in an important position. But the whole scheme of things was to give so much importance to the administrator that the experts in the numerous departments which were administered, including science, had rather a low place in the category, in the scale. I suppose that is somewhat different now. But it has not wholly changed yet. I suppose it will go on changing because even an administrator, however good he is, unless he has some concept of the scientific world we are living in, is not likely to take a correct view of what we have to do.

Much depends on scientists themselves in India. We have a fairly large number of them now and many of them are very eminent. You have several institutions, organisations dealing with scientists and they have large numbers of members, but we have not yet evolved an organisation or an institution which is so outstanding in the quality of its work that is recognised by everyone in the country as representing scientific work, like

the Royal Society in England or the academies in the Soviet Union or like these in other countries. We would rather sacrifice, it seems to me, rather covered up quality with quantity, with the result that quality is sometimes lost in the quantity, and yet science, obviously, depends much more on quality than quantity. Quantity is necessary but quality is the most important thing, and unless we take steps to give due place to quality and not allow it to be covered up by seniority, age and other processes, it will be difficult to go ahead at the pace we want to. Because I do think India is in a peculiarly good position for the advancement of science. I do think that today in India, the younger generation is doing very well and shows promise of very good work in most departments of science, provided they are given the opportunities to go ahead, and given opportunities even to make mistakes and so go ahead. We are so terribly afraid of a person making a mistake that we prevent more good often. That is the governmental way of looking at it. But that is not the way which is likely to be successful in scientific research. So I would suggest to you to think of this, how to have, build up an organisation of quality or, I do not refer to a new organisation, but perhaps within the limits of the organisations that already exist, some method of choosing the men of quality who would give a certain definite colour to the whole institution, organisation. It is obvious that not only has science grown in the past here, is growing, institutions and other things, but it will grow even faster in the future, not only because government wants it to grow but because circumstances compel us to do so and there is no choice left. And if so, it should grow on right foundations. And the right foundations will be laid down by right persons of quality. That applies to governmental work also. We have gradually developed a scientific advisory committee to the cabinet and it advises us occasionally, not very often, it does not meet very often; but however it does advise us and it is helpful. All this shows a gradual attempt on the part of Government even, which is normally reluctant to do so, to recognise that science has a place in life, in human affairs, public affairs. In theory most people accept that. Nobody can deny it when they see the modern world. But usually behind that theoretical acceptance of this fact there is a great deal of mental resistance to it and people do not like to be pushed out of their grooves of thought. But even so I think that mental resistance is slowing down. And in our educational schemes, even though they require a great deal of improvement, the scientific and technical part is receiving more and more attention and therefore they are colouring the thinking of the new generation.

It is obvious that science has played and is going to play a still greater part in the scheme of things all over the world and in our own country. Scientists therefore have to play a double role. One is in the sense of

general development in the world, thinking in the world, and in their own country, how to help in solving the problems which face us and to help in the development of our people. Both are important and both are vital for us. I think we have enough people in the country to help in that process. Where necessary, of course, we shall also always welcome an expert or an adviser from outside, but broadly speaking we must learn, as far as possible, to rely on ourselves. This mental attitude of dependence on others is not a good one. The mental attitude of welcoming advice and help from outside is good but mental dependence is not a good thing. We have to solve our own problems. In solving them we have to get the help of others who can help us, wherever they may come from but the burden has to be borne by us. Not only, if I may say so, the financial burden ultimately, although we ask for financial help and get it too, and we are grateful for it, nevertheless whatever we may get from outside is only a small part of what we have to shoulder ourselves. So also the other burdens. There is no reason why we should not do it. To give you an instance, for years past we have been thinking of a new steel plant at Bokaro, it has become part of our mind, part of our future. Others seem to think of some new projects. To us it is a vital thing, it is a part of our minds now, a thing which we cannot give up whatever happens. It has lasted years and years. Four, five years at least we have been thinking about it, talking about it. Then others came in. They were good enough to advise us and criticise us, which was welcome, both the advice and criticism. It is a very expensive thing and we hoped to get help for it. There were numerous difficulties in the way which delayed it. Ultimately we came to the conclusion that it is not fair to ourselves or fair to other countries to get tied up with this question as to what amount of help they will give us. Therefore we dropped this idea of asking for major help in that way. That was a bit of a blow to us because we had been relying on it so much. But I think in the balance it was a good thing. It made us think for ourselves. It made us realize that after all nothing big is done by almost total reliance on others. And I do not quite know how the things will fashion out. One thing is certain, that we are going ahead with this Bokaro plant, and we are going to shoulder the burden as much as we can. May be we will get some help from here and there, in the main we will shoulder the burden ourselves, not only in other ways, financial and other, but even in material ways. I mean to say, much of the work, the engineering work, would be done by our own people, taking such advice as possible whenever we can. So that it is a good thing to be thrown on one's own resources. To be completely isolated from the world would cast a greater burden on a developing country. We do not mean that. But one must always realize that we have to carry the burden ourselves. And in so far as we can carry it others help us. Nobody helps a people who appear to be

helpless. Now we have advanced in science and technology enough as not to be helpless. Certainly not. And if we can direct our energies in an organised way towards the work that faces us in India, a very great deal can be done. I do not mean to say that anyhow, at any time, we should adopt an attitude of closing our doors on others. That would be bad and opposed to the whole spirit, the approach of science. We should always welcome that. There should be a commerce of ideas and work and cooperation, as indeed we are doing. But, accepting that, we should realise that we have to do things ourselves, carry the burden ourselves. And in that I feel that probably our younger generation is more fitted to do so than perhaps the older generation which is used to different ways, to different habits of thinking in life. And I hope therefore that the younger generation of our scientists will be given every opportunity for creative work, for worthwhile work and not merely do some drudgery which does not perhaps attract them so much. We talk of science so much. I should like to repeat a thing, which I have done frequently before, the saying of one of our great men in India today, Vinoba Bhave. None of you probably associates him with science. He is rather an odd man and India has an odd habit of producing odd men, like Gandhi, which you will not have anywhere else and whom it is difficult to measure by any normal standards. Vinoba Bhave started about twelve, thirteen years ago on a little walk and he is still walking after thirteen or fourteen years, having covered about thirty thousand miles, thirty or forty, for what I know, and visited innumerable villages in every part of India, just walking in this huge country. Now that idea is not likely to strike any of you, or me, to have a little walk of thirty or forty thousand miles and carry on and thus get into intimate contact with the people of India, the villagers of India more specially. Here is a man who is essentially a man of religion, but what he says may interest you. He said the other day that religion and politics are out of date. The world today should be conditioned by science and spirituality. Now, first of all, observe the high place he gives to science, although he is essentially a religious man going about from village to village. Secondly, he replaces religion by spirituality, which is part of religion of course, which is the part which brings various religions together, might not the dogmatic and the controversial parts. So, it is an interesting approach with which personally I respectfully agree, although I do not quite know how to give effect to it. He says that politics and religion are out of date. He means of course certain type of politics which we see in India, possibly elsewhere. It is out of date and bad. How to get rid of the bad is a terribly difficult thing. To recognise it is difficult enough. But after recognising it to get rid of it is much more difficult. Yet one has to try. And it is perhaps up to scientists to try more than others, because scientists claim to have a kind of temper of science, a temper of search for truth, a temper free from bigotry. They do not always have it .

but that is the goal of science. And if we develop science on the right lines it should help us in any kind of work that we do, apart from its immediate results of leading us to fresh discoveries, fresh inventions, fresh avenues. It will cultivate a temper ultimately of philosophy, maybe, ought to. The real difference, one of the differences between the ancient age in India, or Greece, or any of these countries which indulged in philosophical thinking and today is supposed to be, that in those days the background of thought was philosophical, not dogmatic so much, in some places it might have been, certainly it was not so in India or Greece. And therefore that philosophy has endured all this time. Even time has not affected it, those philosophies. Now science as it develops is gradually, I believe, giving rise to that philosophic temper. That is a good thing. But whether that philosophic temper will survive in this age of mental conflict and cold war and the like, I do not know.

Fortunately, talking about the cold war, there is some improvement, a kind of approach to a detente, and possibly this will put an end to the ferocities of the cold war gradually. If so, it will be very good and that will lead perhaps to that great aim of having complete disarmament which will release so much resources in the world for the development of humanity that the advance of the human being in the world can be very rapid. In theory it can be so now too; in practice, it will become so.

I suppose I may be right in saying that we are living in perhaps the most revolutionary age of any since the world began. I realise that the age one lives in almost assumes, becomes big for our eyes, because we see things happening. But I think it is not wrong to say it is revolutionary, and it is revolutionary chiefly because of science and technology which have changed human life beyond recognition, and will change, and are now changing it. If it is revolutionary, we cannot adapt ourselves to it by remaining in some remote age or thought. Thought by being old does not become bad. Certainly not. Most wonderful thinking has been done in olden times, but the method of sticking to some ancient dogma is definitely a bad thing, because science does not stick to any dogma and scientific method is the proper method. And so in this revolutionary age we have to have, to indulge in a bit of revolutionary thinking, possibly action also but certainly of thinking. Otherwise we do not keep pace with this age. The extraordinary fact is that in spite of the development of science and technology so many people, I am not talking of India at the moment, although India is included, but in the advanced countries of the world, are so hopelessly wedded to processes of thought which I should have thought were completely out of date and had no relation to the present day. They take technology and science for granted as some dishes, some courses in a

menu being served to them and go on living their lives and thinking their thoughts in a sense which has no relation to the present environment and the way the world is moving. That is curious. It always happens. Sometimes, although whatever revolutions we have seen, ultimately have come out of the mind of man, yet the pace of events, pace of change in the world is faster than can be kept up easily by the mind of man, individual's mind, I mean by the mass mind. So events occur and change and the mind of man cannot keep pace with it and so there is a hiatus. These changes that are taking place but not habits and superstitions and ways of thinking, all over the world. And I hope that the new generation of scientists in India will gradually change this situation and bring a little more of scientific thinking to people's minds, because we will not survive unless we understand science and serve it by conditioning ourselves to its method of thinking and the climate in which it flourishes.

Well, I hope that having finished fifty years of existence this Science Congress Association will start the next fifty years with spirit and dynamism and carry the flag of science—I should say, science to me is not something intolerant, it should be associated with tolerance. Science by itself may be an amoral thing, a thing which has nothing to do with morality or ethics or anything. I do not think life can be separated from these other qualities. That is why Vinobaji said science plus spirituality. And therefore I hope that science as it goes ahead will also encourage tolerance and compassion. Then it comes into line with the thinking of great men of old and the thinking of the modern age which, if it is fitted into the thinking of the old age, will produce wonderful results. Thank you.

Appendix

Address by Jawaharlal Nehru to the Ceylon Association for the Advancement of Science at the University of Ceylon, Colombo, 15 October 1962*

Science in the Development of a Nation

Mr. Chairman and Friends,

When I was invited to address you on this subject, "The Place of Science in the Development of a Nation", naturally I agreed because the subject interested me—but that does not mean any particular competence in dealing with it. The remarks of the Chairman alarmed me because he said something about my being a noted scientist (laughter), because a trifle over a half century ago I took my degree in Science in Cambridge University. Well, all that I learnt of Science, or nearly all, has subsequently been upset and changed by later discoveries and if I was asked to speak on the present state of Science, or nearly all I would say is that it is greatly changed from what it was (laughter). So a subject like this which as I have said is a fascinating subject and a very important one, should be dealt with by a person more competent to do so. Although, as the Chairman has said, I attach great value to Science and we have tried to encourage the growth of Scientific Research and Laboratories in India, that is not enough for a scholarly account of the subject.

What exactly do you call Science? And what do you call National Development? The answers are obvious and yet not so clear. Many things are called Science which probably do not deserve that name, for Science has to grow by a patient accumulation of facts, and by advances, occasionally sudden advances, by some discoveries of geniuses, but chiefly by a patient accumulation of facts. And one fact ought also to be remembered, that Science acknowledges no authority to which it must bow except to show proof by experimentation or error. The biggest scientist may lay down rules and the smallest scientist may prove that it was wrong, and the big one will have to accept it, so the question of status does not

*This is a verbatim report of the Address by Jawaharlal Nehru who spoke without any notes to the Ceylon Association for the Advancement of Science, *Science in the Development of a Nation* (Colombo, October 1962).

come in, except of course that the big man is a big man, he has done fine work, but the smallest scientist can, if he has adequate reason to do so, challenge the thesis of a bigger scientist and show by experiment that something else is a better theory. So he does not believe in hierarchies of status, Science does not believe in authoritarianism of anything and, if I may say so with all respect, in Public Affairs and Politics, even in Religion, Science challenges that too, not disrespectfully but simply because it does not wish to accept anything without adequate proof being afforded to it. It does not accept pure speculation. It may indulge in it occasionally but that has to be justified by experiment.

And then again, what is the Development of a Nation? You can use it in the limited but important sense of raising the standards of the people, better living conditions, the necessaries of life, etc. being provided for all the people, your building up what is now called an affluent society, and so on. Now it is clear that Science has largely been instrumental in making and bringing about the enormous changes in life and living conditions prevalent today, more specially the conditions among the affluent nations of today, i.e., the West European Nations, the United States of America, the Soviet Union, Japan and many other countries. It is said that the Industrial Revolution changed the face of the world—which it did. How did the Industrial Revolution come about? It was preceded by some kind of Scientific Revolution, not something sudden that happened, but in the course of two or three hundred years. Many things happened in Europe to begin with, earlier elsewhere. Earlier still of course there was the beginning of Science, I would presume to say in India, certainly in the Arab world, certainly in the Greek world. But fundamentally all this became important with the movement in the 18th century in Europe. In France, before the French Revolution, you read about the Age of Reason, French Encyclopaedists, etc. All these were preparing the environment for the advance of Science, and when the advance of Science came it led to advance in technology. Changes in technology resulted in greater production and greater production ultimately led to greater wealth distribution, to raising of the level of the people.

There were of course many difficulties in the way and many tragedies, and those of you who have read any account of the early days of the Industrial Revolution will remember the painful condition of the workers and others in those days, in England and elsewhere. But, frankly the fact remains that Science led to the improvement of technology, technology led to greater production and greater production led to a number of changes which have revolutionised life. Also, as these changes took place, Science

going ahead, we had the Industrial Revolution. We had some time later the Electrical Revolution and we continue in having extraordinary changes which are really a continuation of the Industrial Revolution, or the Revolution of Science, whichever way you like to call it. It is obvious, therefore, that Science or the methods of Science have been instrumental in releasing, partly at least, the world of the belief that the poor are always with us, the horror of continuing poverty. You see that for thousands of years in human history the *per capita* income of an individual was very low. It did not change or if it did change the fluctuations were limited. Suddenly something comes that is the beginning of the Machine Age which increases the national income of the country and the *per capita* income, the big change comes, and that goes on, and all that is ultimately due to the application of scientific method to methods of production, etc. That is obvious. And one may say that if we seek to develop a nation more or less in the same way and make it more wealth-producing then inevitably you have to adopt methods which help you to produce more wealth, and those methods of production, etc. can only come through technological techniques. That seems to be obvious, but there is something more about it. You may put up a factory or a plant and the factory may work and produce dividends, too, but if you are going to do something which will affect the nation—large masses of people—you have to affect those masses of people in their thinking. Therefore wherever these revolutions have taken place, industrial or scientific, there has been mass education. You can't have an illiterate country having an Industrial Revolution or any revolution or a scientific one. Apart from mass education comprising everybody, we must have scientific education comprising, not everybody, but large numbers, and technical education. That becomes essential. And you find that happening in all these countries before the various changes came about. One of the most interesting examples is that of Japan, where you see a society completely changed according to plan and changed not suddenly but within relatively a brief period of time and the Japanese when they decided to change in the last century about the eighties (I forget the exact date) one of the first thing they introduced was mass education and training of people. They sent large numbers of people abroad to find out what this new world was which they were going to adopt, and they showed remarkable aptitude, as we all know.

Now there is one of the other aspects which I should like to put before you. I said, what kind of development do you aim at? Obviously we want to develop on the material plane, we want to build up a society where it is open to every person to lead what might be called the Good Life. Science helps that, but Science also, in addition to the numerous good

things it has done, has also produced many bad things. To give an obvious example, nuclear weapons, atomic bombs and the rest, which threaten to exterminate humanity and put an end to civilization as we know it. Now Science is, therefore, not so much concerned with ultimate values, cultural, spiritual, or anything else of that kind. It is an amoral force. Though it does impinge upon morality, but on the whole it is an amoral force, and because of that one may say that although Science is essential and without Science we cannot go ahead in a nation, Science is not by itself complete in the sense that it provides everything that a human being or a society should require. That is my submission to you. Otherwise, why should Science which has done so much good threaten to do something which will destroy humanity? It is a problem which probably not my generation, but the next generation—those who are at colleges, students in colleges—may solve, but it is worth remembering. I am praising Science and applying Science as far as I can, but at the back of my thought is the tremendous power that Science gives the society which is not wise enough to use it properly. Therefore, you have to do something to increase the wisdom of human beings so that they may use these powers rightly, or else it destroys them. That is a problem rather beyond the scope of what I am talking to you. But it is worth remembering that you cannot become a purely scientific animal without the humanistic, the spiritual approach to your thinking. Then again I am giving you an odd example of something which is not Science in the modern acceptance of the term. You have heard, all of you, I suppose, of Mahatma Gandhi. He was a man who was not a scientist in the technical sense and yet who wrought amazing changes in vast numbers of human beings in his country and whose influence, subsequently spread to other countries. Just recently, two weeks ago, I was in Nigeria and was surprised to find the influence, the distant influence, of Gandhi. Now it is difficult to analyse this, to say what it was due to, but he brought into operation certain forces which are not material forces, which are not the forces that give strength to an army or to a ruler, but other forces in another domain which powerfully affected people. One can only say those forces were in some way more spiritual, like some teachers have powerfully shown, the Buddha for instance. Therefore Science, although it is a very great thing and an essential thing, is not by itself enough. Something else should accompany it if you want to get either the individual—the properly developed, integrated individual—or the society that is integrated. To give you another example of a person whose name you may not have heard, but one of the favourite disciples or followers of Gandhi in India, Vinoba Bhave. While all these changes were happening in India, political, economic and the rest of it, he has been walking throughout India, just walking from village to village, without any pomp or show or advertisement and he has walked for the last 12 years . . .

continuously. Calculate how much he has walked; he walks about 6, 7 or 8 miles a day; he has walked about 40,000 miles! He has been everywhere in India, most villages. Recently he passed through a bit of Pakistan coming from Assam to West Bengal. I mention him because he represents to me a force, like his master Gandhi, which is not measurable by ordinary standards, politician's standards and others. Wherever he goes he takes the message of peace and goodwill. He does not speak politically, he asks people to share their land, give a bit of their land to those who have not got the land, and so on. There have been aspects of life which are highly important and yet which we are apt to ignore in our discussions of politics or economics or science.

Now, Science is some kind of objective trying to find out the objective truth of something. You may not succeed in doing so, you may be misled, you will have to correct your error, but what is important is the mind which approaches, the climate of the mind, the scientific outlook of the mind, which may make mistakes and correct itself. Therefore, the scientific revolution has to come in the minds of men. Just as in the UNESCO Charter it is said that wars start in the minds of men, which is perfectly true, so the scientific method or attitude has to start in the minds of men. It is not merely a matter of some students going and pottering about in the laboratory and calling themselves scientists. They have to develop that attitude of mind which is the search for truth, a rather ruthless search, ruthless in the sense of discarding all that does not fit into the truth you are seeking for, or, at any rate, not accepting it if you don't discard it. I say so, it is extraordinary how we find scientists, sometimes very noted scientists, being very good in their own domain and, coming out of it in some other department of life, being hopelessly at sea and most unscientific in other departments of life. That is unfortunate. He has developed in a lop-sided way; he does his work very well, but he is not a fully integrated personality all the same. Few of us are, really, I don't know!

It is obvious that you have seen how the development of Science and Technology have revolutionised human existence all over the world and more specially in certain nations in the West which contain the affluent societies which are changing still more rapidly. Science has changed the methods of production on land, in industry, and brought about the Industrial Revolution and the subsequent revolutions in techniques which are continually occurring. Now if we want to have the Industrial Revolution in our underdeveloped and developing countries we shall have, inevitably have to take advantage of Science to bring to bear and utilize those techniques. If we do that, it does not necessarily follow that we copy the exact steps that are taken by other countries or the processes which they went through

but basically we have to go to Science for that purpose, and to technology. We accept that part of technology which may suit our own circumstances—that's a different matter—but we have to go through those basic processes. That would certainly lead to greater production, greater wealth. That may not lead to a complete solution of our problems, because that depends, as I pointed out to other factors also.

Now Science, as I said, does not believe in hierarchies and status due to heredity, and the like. In order to create an atmosphere for the success of Science and for the success of scientific development you may have to change, let us say in agriculture, to a more scientific type of agriculture. You may have to change the land in your system to bring it more in line with reasonable scientific method and more people will have progress. You can't have progress, let us say, if the land in your system is feudal. You just can't, the whole concept is so anti-scientific. You may—I don't say you can't—have a good farm as a feudal owner might but as a whole you cannot produce those effects which scientific agriculture might bring about. By scientific agriculture I am not meaning for the moment that you should mechanise everything. That depends entirely on circumstances, on the type of things you grow. For instance, rice does not yield to mechanisation; wheat may, that again depends on the circumstances which you have to face. But I do say that the technique has to be a modern technique. You in Ceylon, just as we in India, are trying to increase the production of rice, and are succeeding to some extent. In doing so you are trying to copy the techniques which have yielded results elsewhere, as we are, but my point is that the institutional, social framework has to undergo some changes before Science can have full play, and a feudal system does not permit that change, or anything approaching the feudal system. Or maybe you will find that when you want to change the social system the first subject which has to be attacked is land, agrarian system, partly because it affects large numbers of people, partly because it influences other activities. To some extent it is fairly difficult. You have to change your institutions so that they may function in a scientific way and not merely according to hierarchies and seniority and the like. That applies to Government servants—very difficult to change this, because the apparatus of Government is built on seniority. (laughter). People talk of the appeal of merit, but merit has no chance against seniority. (Laughter). Again, the official hierarchy of that type usually treats the scientist as an outsider, yes, good enough to advise them occasionally, but a person who ought to know his own place in society and not be uppish! (Laughter). The result is that the atmosphere is not created for the development of Science rapidly. Of course it does develop somewhat. It is necessary to give every opportunity to scientists, to give him some status in society, to not have such differences

in regard to what you pay him and pay others, as necessarily to make people feel that he is some inferior being to the administrative class or the political class. All these are just methods to give more importance to the scientist so that he can work freely and have a sense of satisfaction about work.

Then, as I just referred, you must have mass education, some common atmosphere of education plus large scale scientific training. That is very essential, because all modern techniques require trained men, and unless you train the men—and you got to train men—you can't do the job however much in theory you might want to do it. You may ask someone else to do it but that is not developing the nation. If somebody comes here—Japanese or German or American or Russian—and does a job for you, it may be necessary to begin with, but the object always is that you should train your own men to do the job. You may have a steel plant: a steel plant may take six, seven years to be completed but, remember, the man who is going to run the steel plant will probably require fifteen years at least of training or more. Therefore, you have to think of training that man long before you start your plant or else you will have to depend on others. And that applies to anything that you may do. That's where specially planning comes in. You have to look ahead and think in terms not of immediate problems, although you can't ignore immediate problems. Sometimes in India we have five year plans – five years is too short a period. You have to look ahead fifteen years, twenty years, because you have to train people to meet the needs of your society ten years hence, fifteen years hence. If we don't train them, there will be a gap, hiatus and you may not be able to work it. You have trained scientists and thus your planning should be a continued process, and aiming at certain objectives specially which you have in view. It is no good training generally in science alone. That, of course, you will have to do, but for specialised vocations you want so many engineers—train them, and so many other things.

We hear a great deal about private enterprise and public enterprise and social control and so on. The argument is not based on facts but on certain ideological approaches or theories. The fact is that in the 19th century private enterprise had a great deal to do in furthering the Industrial Revolution in certain countries of the West, and it produced results, although it or the human beings paid heavily for it. But it did produce results. In the modern context private enterprise of that type which existed in the 19th century in some countries is completely out of date. There is hardly anybody who can advocate that kind of *laissez faire* tradition. Even

in a country like the United States, which is supposed to be the citadel of private enterprise, there are more social controls than I believe we have in India—and we talk of socialism all the time in India! You see how words confuse us and get us away from reality. Today it is recognized that there must be various types of social controls. Just as we have a police force to tc keep the criminal in check you have to have social control to keep the other type of malefactor in check who injures society. So these arguments about private enterprise and public enterprise have lost much of their force, although they are still important.

Now, taking the case of an underdeveloped country that wants to develop, what is it going to do? First of all it has to decide what its objectives should be. I think the objective can only be a raising of the standard of living of its people generally speaking; not the creation of a few rich men, a small group of very affluent persons, the large majority remaining poor, that can't be the objective of any decent society. Therefore, it will aim at raising the general standard in every way, materially, educationally, culturally and in other ways. For that purpose, it has to build many things, to invest capital for bettering of agriculture by modern methods, introducing industry and the like, as well as educational and health services and the like. Now a poor country has very little resources, because it is poor it has little resources, and it can't easily invest all that is necessary in order gradually to grow rich. There is no escape from it. It has to go through a hard period when, however poor it may be, it has to develop a surplus for progress. It may, of course, have help from outside during this period. That is why there is so much talk and recognition in fact generally among the affluent countries of helping developing societies. There is a great deal of talk and there is some recognition of that fact, not adequate enough I think, but still there is some recognition and a growing recognition. There is no other way to advance. Either you increase your own difficulties by living a hard life and saving money as a nation in order to invest it for future progress and bring good returns, or else you are aided in some ways by loans, credits or whatever it may be and thereby you increase your capacity, to increase it not suddenly but gradually by various processes of education, of improving agriculture, of better techniques in industry, new industries and the like. And as you do this and as you increase the wealth-producing capacity of your country, where is the surplus to go to? Well, again there is a hard choice; your people have suffered so much from the shortage of the necessities of life, and we naturally like the surplus to go to them so that they may have some little comfort. Yet you dare not give them all the surplus, some will have to go to them. You dare not give them all because you require that very surplus for further advance. It is a difficult choice for every politician to make—the balancing of it, how much

should go in material benefits to the people, and how much will be kept apart for further investment in progress. Yet it has to be done. You see in a country like the United States the productive apparatus has advanced so well that in spite of (if I may say so with all respect) a very wasteful economy yet they have enormous surpluses left over. In spite of vast expenditure on armaments, yet they have surpluses left over! That kind of fortunate position can hardly be repeated anywhere in the world at the present moment; much less in an underdeveloped country where we live from hand to mouth, there will be no surpluses, practically speaking. And when we get a surplus the immediate desire is to give it back to our people who have been so hard-up for all these years. Something has to be given to them, otherwise they become devoid of hope and do not work properly. Something has to be given to them that is essential, but if you give everything to them you have nothing left for the progress you want. Now, therefore, in a country I should say that always planning is desirable, more so in a country which has limited resources. You have to plan so as to put those resources to the best advantage, otherwise they may be used, not for bad purposes, but not for such purposes as yield results from the point of view of a developing nation. Planning becomes essential, also planning priorities: where you should spend the money—there are so many things that demand your money, you haven't got nearly enough for all. You have to deal with first things first, which lead on to something else. Now the normal owner wants to invest his money etc. so as to get a big dividend as soon as possible. Very few think in terms of twenty years later what the nation would be like. It is inevitable that he must think of some quick return of his money, he will hardly ever go in for, let us say, any major hydro-electric schemes which are very essential for a country's development, and yet it is more necessary to have the hydro-electric scheme than some plant producing some consumers' goods. Therein lies the difficulty about leaving matters to chance or to private enterprise. Private enterprise will not plan for the growth of a nation, but will plan for the growth of its own enterprise. Now the growth of its own enterprise may help in the growth of the nation—not necessarily, but it may—and the sum total of all private enterprise may be appreciable. But it will not direct itself to the sole aim of national growth. Therefore, planning becomes essential. Therefore also, according to my thinking, a growing public sector becomes equally essential, that is state enterprises. The private sector need not be ruled out, because you want everything to promote production and wealth formation. But the national economy must be directed to a certain end and everything should subserve that interest, not the private interest of the individual. Private interests may come into the picture—they do come in—but subject always to the public interest.

Therefore planning is essential, and everywhere it is essential. What is planning? Planning is an intelligent application of your resources to reach the aims desired, and I could hardly imagine anybody say 'No, we must not do it intelligently, we must do it unintelligently and leave things to chance!' Surely the issues are too grave to be left to chance, or to the motives of the private enterprise person however evil or good he may be. This was nineteenth century economics. That no longer holds the field. I said that everywhere socialisation, social forces, social controls are coming into play—to what extent is a different matter. They may be very, very great in a Communist country, somewhat less in a socialist country, but even in Capitalist countries they are coming into the picture. In fact, I should like you to think that the differences which apparently exist between two extremes like a Communist country and a Capitalist country like the United States are not so great as people have imagined. They are very considerable, I admit. But still, the ferocity with which one attacks the the other and considers it the embodiment of the devil is hardly justified. Essentially both are aiming at scientific societies, with many drawbacks to them, but still a society based on Science and the Machine. They both build bigger and bigger machines, they both try to reach the moon through machines and through Science, and so on and so forth. So their line of approach is much the same; their theory, their ideology as it is said, may be somewhat different but they approach each other, and I have no doubt that if the cold war was not there the tendency to approach each other would be far greater. There is no doubt that in the Soviet Union, the old style Communism has been toned down very greatly. Individual freedom is still lacking in the Western Europe sense, but is far greater than it was and there is a movement in that direction. In the United States, as I pointed out, social controls continue to come and will no doubt continue to come. Their anti-trust laws, anti-monopoly laws—they are all social controls. So, if the ferocity of the cold war was lessened and fear in each other was also controlled probably each country would affect each other. I mention these two powers because they are the greatest in the world to affect other countries and other powers too.

Coming back to planning. We decided to plan. How we plan would obviously depend on the country concerned, on its resources, apart from what it wants to become. Planning for Ceylon would obviously be on a different scale and different type than planning for India. What it should be is not for me to say, it's for you to decide. But it would depend on what kind of minerals you have, what kind of resources you have, how you apply them. In a big country like India we have, by and large, most of the minerals present, some in large quantities, some in lesser. But almost inevitably, every country, big or small, requires power resources. In a sense

power is the test of how far you have progressed or how far you are going to progress, and it is because in old days the power available was very little for the human being that progress was very limited. To go back to my own country, I refer to India as being in the cowdung age. It sounds bad, doesn't it? But I wanted to shock people. The chief source of power in India in spite of the growth of hydro-electric power, thermal power, atomic power and what not, is still – if you take the villages as a whole – cowdung! Extraordinary, isn't it? India is a big country. It is the growth of power that gives you opportunities to progress in all directions. Lenin, I think, once said that his idea of Communism was Soviet plus Electric Power (laughter), and that was acceptable I believe to a representative of the Tsars who when he heard of this said he was willing to have that type of Communism. So power is most important. You must know the facts before you can plan. You can't plan in the air, as politicians normally do! (Laughter). Therefore, you must have a thorough survey of your country and find out what exactly the country possesses, underground, above ground and all that. Knowing the facts of what you have then you can start planning. In planning, inevitably you will have to give great importance to power, whether it is hydro-electric power or thermal power— depends on circumstances, you should utilize every opportunity, where it is available, of water power because electric power is the most revolutionary thing that you can have. Power is revolutionary by itself. You take it to a village and it changes the life of the village. It tends to introduce small industries or big industries in the village. Therefore, power has all this precedence in any plan that you may have.

Broadly you have to appreciate that without the growth of industry, you cannot increase the wealth of the country very much. Therefore, industry is important. But the moment you touch the growth of industry you come up against a basic problem that industry cannot progress except on a sound agricultural basis. And immediately you are thrown back to agriculture, and agriculture is, for any agricultural country like India certainly, the most important thing ultimately. I realise that agriculture by itself will not solve the country's problems and with the introduction of modern types of agriculture the number of the unemployed will grow. Today, they hang on to the land, but with better techniques fewer men are necessary. So instead of solving the problems it actually might make them more acute. But agriculture is the basis. If you don't have proper agriculture then you will not get the surplus from agriculture which can be utilised for production in industry. But really, to say that this has greater priority than the other has a different meaning, because in planning you have to proceed at the same time on all sides, you can't proceed along one thing. Agriculture or industry both require power. Then as you produce things you require

transport and so many other things– transport to take raw materials to the factory, to take away the goods made either in the field or factory. And you require education and health services, and all that. You can't take them one by one and complete in one process. You have to—that is the essence of planning—take them all together. Then another question arises, at least it arises in India (I am not sure about Ceylon, because Ceylon's size is relatively small and it has to be viewed perhaps differently) and that is the balance first of all between agriculture and industry; then, in industry, between light industry and heavy industry, consumer industry or basic industry. It is easy to put up some consumer industries, and it is useful too, but consumer industries will depend on machinery coming from abroad, you will depend upon that for spare parts for the machines and everything and you cannot make very good progress if you are constantly importing machinery from abroad. You have to import it to begin with, but some steps should be taken to produce the machinery in your own country if you can, rather than rely on others. Therefore, heavy industry comes into being to produce things like iron and steel, many chemical things, goods and producing the machine-making industry. Once heavy industry is there, the lighter industries can be built up rapidly because you needn't get them from outside, you get the machinery in India and in the country concerned. The Japanese, so far as I remember, seldom imported a machine twice from outside in the early days, not now. (Laughter). They imported one machine and sat down to make one themselves like it. It was not so good to begin with, it didn't matter, they went on improving it. It is very instructive to learn how Japan built up her economy and revolutionised her whole industrial and agricultural system by a planned approach to the problem. We think that planning is necessarily something communistic or socialistic. That is not true, of course every country plans to some extent. The only thing that comes in the way of planning are sometimes big private interests, therefore it is necessary to decide whether the big private interests are to dictate the nature of planning, or the national interest such as you can see it. Now in Japan there was no talk of communism or socialism in the days they did it, very little anyway, but they are a very disciplined people and the Emperor's word was almost law to them and the able advisers of the Emperor told him to say the right things to the people, and the people took them and acted accordingly and made remarkable progress in a short time. Well, that way is not open to most countries: we haven't got Emperors or any persons whose word is law to the people and specially in a democratic country one has to convince the people –and that is not quite so easy, to convince them to endure greater hardships is never easy, to convince them that taxation is desirable for their own future benefit doesn't go down very much (laughter) and yet it has to be done and perhaps to some extent it can be done if it is properly explained.

Of course in our structure of Parliamentary Government, whatever a Government may try to do there is the Opposition or Oppositions to run it down. All these difficulties occur. Therefore, planning is peculiarly difficult in a democratic structure of Government. There is so much opposition to be faced, which opposes for purely political reasons and perhaps not for economic or other reasons. Normally a national plan should be really a national plan with the goodwill, in the main things, of the principal partics of the State: in details they may differ, but broadly they should agree. It is a good thing to carry them with you because then there is a united approach and you can go further that way, but it's not easy to have.

If I may repeat what I have said, the modern world is a world based on Sciencc, there is no doubt about it and it is becoming more and more progressively based on Science. By ignoring this fact you get nowhere, by accepting it—not only accepting it in theory but in practicc—you are likely to get somewhere, provided you accept it in practice and train up scientists. And what is most important is to cultivate the scientific type of mind, the inquiring type of mind, the type of mind that does not accept anything without proving it, and not merely on authority. There is no way to get rid of poverty of the people except greater wealth production in the country, wealth production from the land, from industry. Industry may be of all kinds, small industry, village industry, big industry, heavy industry, and so on and so forth. Now, how you apportion work for the development of agriculture and industry is a thing which requires careful thought and planning and it will always require that. You can't make a plan too rigid because we have to deal with unknown or factors that you cannot measure. For instance, a vast deal depends in India—I suppose it does here too to some extent—on the monsoons and the rains. If the rains fail in one year our whole programme is completcly upset; instead of abundance we have famine. So many things may happen which are not within our control thus far; we can of course protect against emergencies: we may have stocks of food even if famine occurs, we may have irrigation systems, spread them out, which can do without rain if necessary. That has to be done, but still for some time to come we have to depend to some extent on nature's vagaries. One thing more. Planning can only be done on facts. We must therefore get proper facts. Facts are normally supplied by departments of Statistics. Now Statistics is a Science which has grown greatly in the last many years. Statistics is not merely a compilation of how many people die, the death rate or the birth rate (though these are important) but of many social factors too. Properly carried out, a statistical survey should givc you a picture of the society in its social sense, a social picture—and that again will help you. For instance, we have been inquiring in India as to where the increasing wealth of the country in the

last ten years has gone. We suspect that some of it of course has gone to the people generally, we suspect a good part of it has gone into a few pockets (laughter) and we don't like that! To some extent that is inevitable, you can't easily help it. Take the good peasant and the bad peasant: the good peasant produces more and makes more progress and the distance between the good peasant and the bad peasant increases continuously because he produces more, he gets better implements, he can make better use of them. That is so, the enterprising person and the non-enterprising person. You can't suppress enterprise and encourage sheer laziness aud stupidity. Yet we do not want to tell a person to get away with it, and that requires various arrangements and various social approaches to the problems which are not easy. But what I was pointing out was that the science of Statistics is very important in planning today, and it has to be developed fully and scientifically, taking it into its scope the nature of the society you are serving and not merely some odd facts about income and expenditure.

Well, I do not know, Mr. Chairman, if I have dealt at all adequately with the subject you asked me to speak on. Properly that should have been dealt with in an academic way and concisely. As you may have noticed I have dealt with it in the manner of a politician—which I am. But I do believe quite stoutly that the whole method of Science, the approach of Science is essential for the survival of humanity, not only for the good of my own country or your country or underdeveloped countries but, I say, for the survival of humanity, because this kind of thing cannot easily continue for long: a small part of the world in affluent circumstances and a large part of the world in depressing poverty. It would produce crises all the time. Finally, I am again going back to what I have said at the beginning. Science can and does produce the goods you want in terms of material advantage provided always you are prepared to work hard for it. You can get nothing without work. Science is not some Aladdin's lamp. You have to work hard. That is a thing we must always remember, that a country progresses only to the extent it works. If it does not work hard enough it doesn't progress or it progresses only half the way. That is so, but in addition to that Science with all its manifold benefits and virtues does not solve the moral or the spiritual problems of what a human being or a society should do. That is something in addition to it, and if some kind of check doesn't come, Science, it may well destroy whatever it has created. I referred to Vinoba Bhave a little while ago because he symbolises to me—I believe he is the only or at any rate one of the very few disciples of Gandhi now in India—he symbolises something which takes me out of the common rut of my activities, makes me think afresh, just as Gandhiji did. Now, Vinoba Bhave has been saying lately—mind

you he is a deeply religious man, only religious men behave in the manner he is behaving—but he used a phrase that struck me as being arresting. He said: "Politics and Religion (he meant old-fashioned religion) are out of date; what is required now is Science and Spirituality."

Now it is worth thinking about that phrase. That is, he took spirituality in religion and didn't lay stress on the ritual of it. Spirituality is something in common in several religions, whatever it is. Anyhow, it is the most important part, I take it, of religion and of the human being. So he said, Politics and Religion are no longer necessary, they should be replaced by Science and Spirituality. What exactly he meant I don't know, but the phrase appealed to me and I think without Science there is no future for any society, but even with Science, unless it is controlled by some spiritual impulses, there is also no future. Thank you.